

Republic of India

State of Himachal Pradesh, Department of Agriculture

**THE PREPARATORY SURVEY
ON
HIMACHAL PRADESH CROP
DIVERSIFICATION PROMOTION
PROJECT PHASE-II (HPCDP II)
IN
REPUBLIC OF INDIA
FINAL REPORT
(Advanced Version)
VOLUME-I
MAIN REPORT**

March 2021

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

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JR(P)
21-013

**THE PREPARATORY SURVEY
ON
HIMACHAL PRADESH CROP DIVERSIFICATION
PROMOTION PROJECT PHASE-II (HPCDP II)
IN
REPUBLIC OF INDIA**

FINAL REPORT

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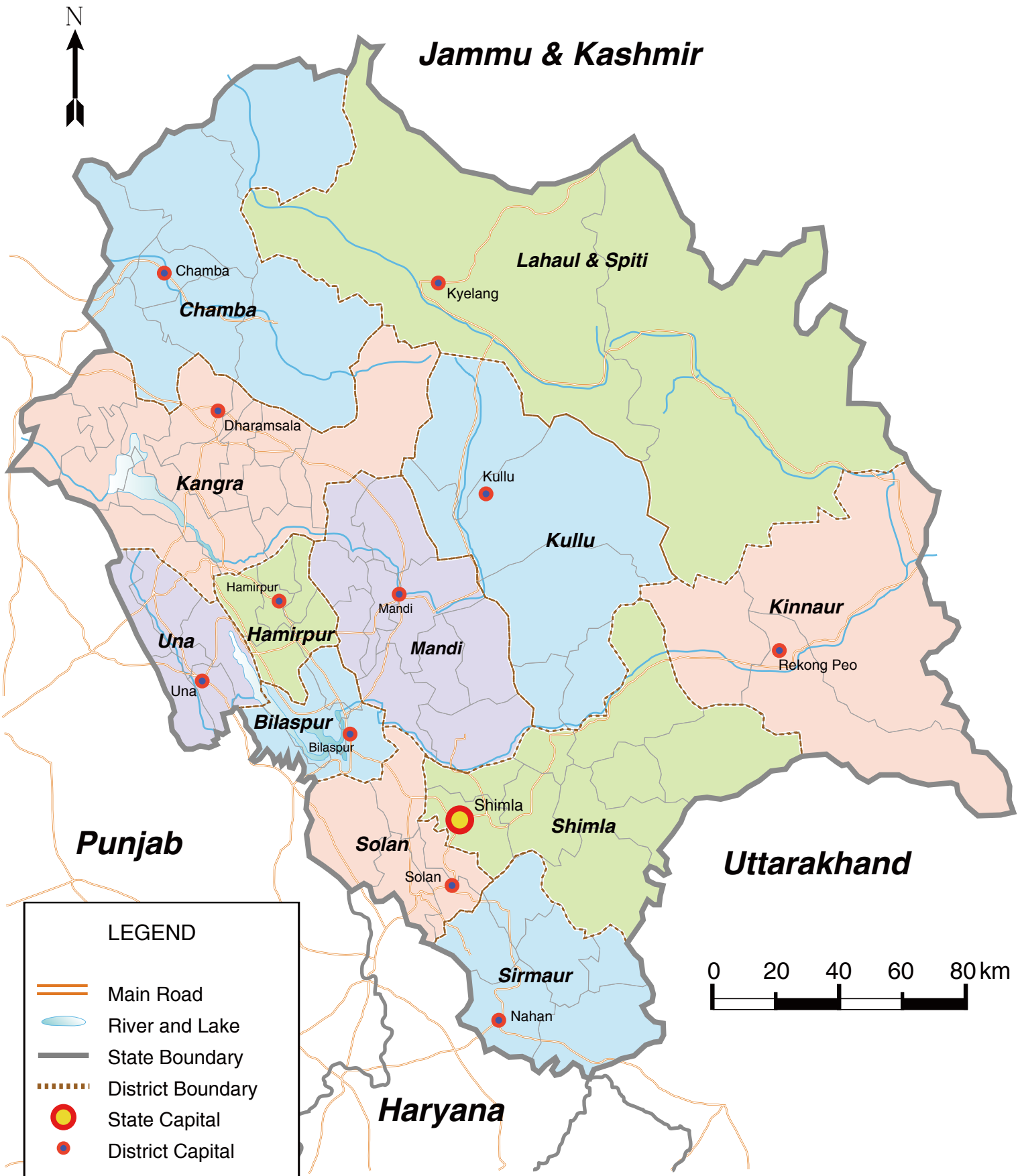
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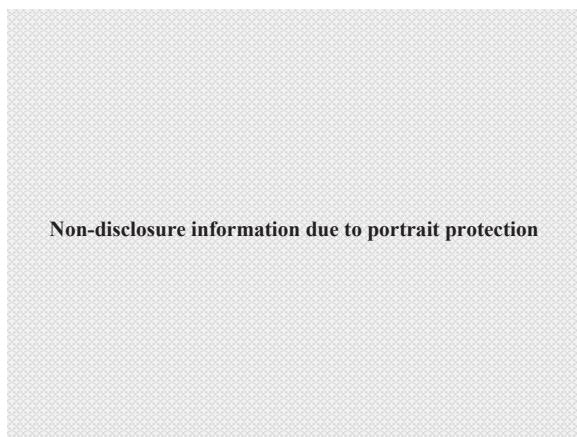
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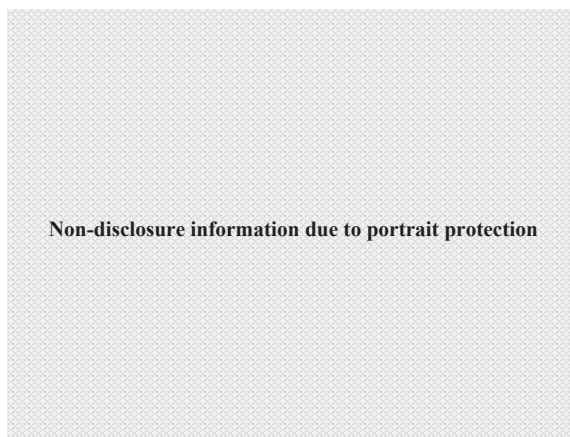


Project Location Map

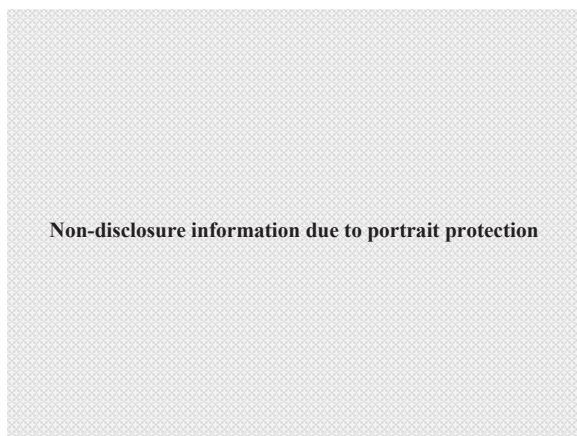
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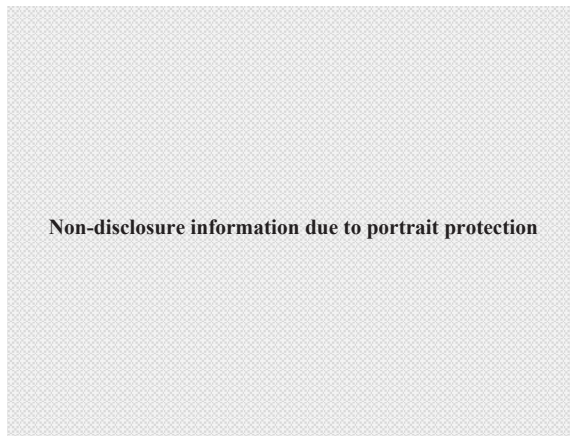
View of the discussion with Farmers on Agricultural and Economic situation at village Samella, G.P Samella, District Hamirpur



View of the discussion with Farmers on Agricultural Gender at village Kaned, G.P Kaned, District Kangra



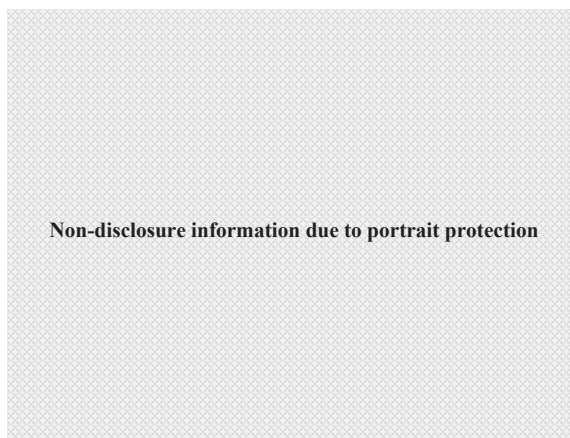
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View of the field survey on Crop distribution volume at village Bhuthi, G.P Brahman, District Kullu



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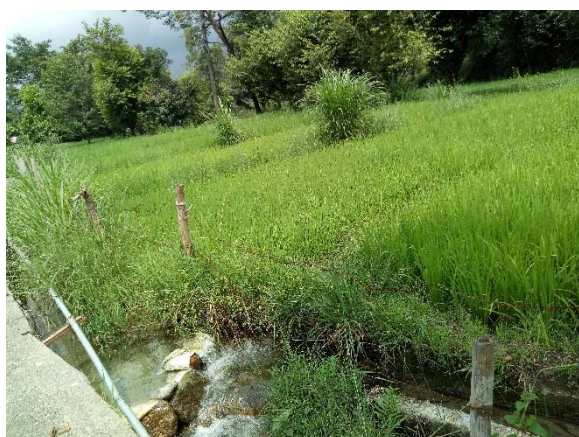
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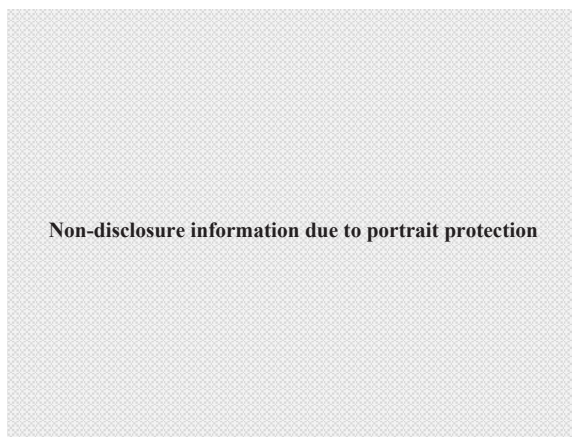
View of the field survey on Existing cultivated field (Potato) at village Gemoor, G.P Kalilong, District Lahaul&Spiti



View of the field survey on Existing cultivated field (Cabbage) at village Gemoor, G.P Kalilong, District Lahaul&Spiti



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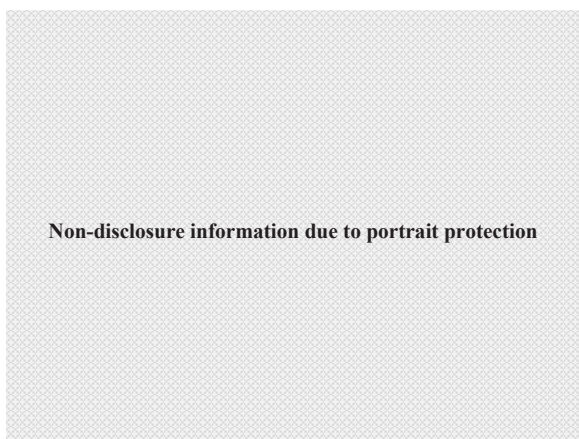
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View of the field survey on Water Source at G.P Kuddi, District Bilaspur



View of the field survey on existing channel of Chir Pine made by farmers for taking water for irrigation at village Ghara, G.P nerwa, District Shimla



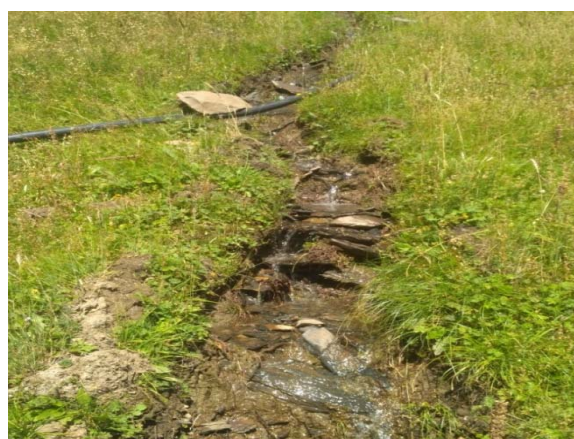
View of the field survey on Water Source at G.P Sainji, District Mandi



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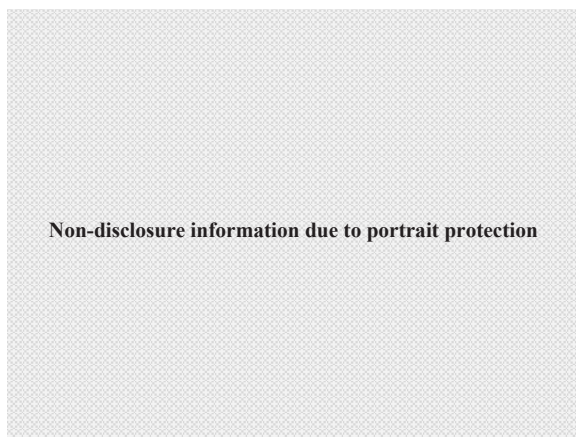


View of the field survey on Water Source at G.P Jagnoli, District Kangra



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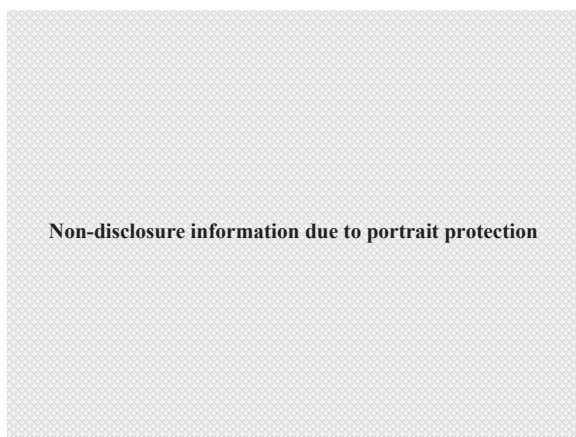
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View of the field survey on existing cultivated potato with sprinkler at village Peukar, G.P Barbog, District Lahaul&Spiti



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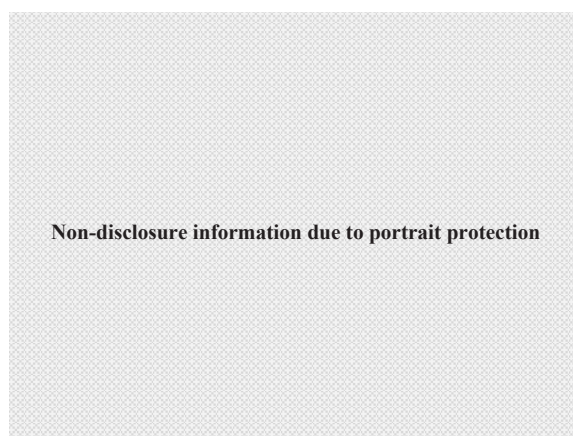
View of the laying of Pipeline at LIS in HPCDP



View of the laying Shallow Tube Well in HPCDP



View of Discussion with HPSAMB on Marketing Research in Shimla



View of Discussion with DOH in Shimla

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Non-disclosure information due to portrait protection

View of Inception meeting between JICA, JICA Survey Team and Government of HP state (1/2)
(14th July, 2020)



Non-disclosure information due to portrait protection

View of Inception meeting between JICA, JICA Survey Team and Government of HP state (2/2)
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View of Bi-weekly Progress Meeting with HP state stakeholders (1/2)
(28th August, 2020)



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(11th September, 2020)



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View of Orientation Meeting and Training of Enumerators for Sample Survey
(4th August 2020)



Non-disclosure information due to portrait protection

View of the Review Meeting among the Survey Team
(29th October 2020)

Summary

Chapter 1 : Introduction

1. This final report is prepared in accordance with the terms of reference of the contract agreement between the Japan International Cooperation Agency (JICA) and Nippon Koei Co., Ltd. signed on 8th July 2020 for the Preparatory Survey on Himachal Pradesh Crop Diversification Promotion Project Phase-II (HPCDP II). The main objective of the HPCDP II is to promote crop diversification and value addition of the agriculture produce in the State of HP, through development of infrastructure facilities such as irrigation facilities and farm access roads, along with promotion of marketing and strengthening agriculture extension service, which ultimately improves livelihood of the farmers in the area.
2. The survey intends to compile necessary information and recommendation for execution of the abovementioned project as ODA Loan project funded by JICA based on the lessons learnt from HPCDP I. Validity and rational of the project shall be confirmed through review and analysis of DPR especially on proposed programmes, implementing schedule, organisation, procurement, construction management, total project cost, environment and social consideration issues, economic and financial analysis, and output indicator. The target survey area is the whole 12 Districts of the state of Himachal Pradesh (Hamirpur, Mandi, Kangra, Una, Bilaspur, Shimla, Sirmaur, Kinnaur, Kullu, Lahul and Spiti, Chamba, and Solan).

Chapter 2 : Natural and Socio-Economic Status of the Survey Area

3. The geographical area of HP is 55,673 km² in total, bordering the Jammu and Kashmir State in the north to northwest, Tibet in the east, the Uttarakhand State in the southeast, the Haryana State in south and the Punjab State in the southwest to west. According to the 2011 census, the total population of the State is 6,864,602, and the projected population for 2019 amounts to 7,542,000. The overall decennial growth rate of the population is 12.9% during 2001-2011, whereas the growth rate between 2011 and 2021 is projected to be 9.46%. Even though the growth rate has eased between 2011-2021, the population of HP continues to grow by nearly 10%. Looking into the population distribution in rural and urban area, 90% of the population lives in rural setting.
4. Regarding sex ratio in HP, the number of females per thousand males in the state average is 972, while national average is 940. Assessing the population by social classification, about one fourth of the state population is classified as Scheduled Caste and the majority of Scheduled Tribes are settled in certain areas of Lahaul-Spiti, Kinnaur and Chamba District, which are situated in the hinterland behind high mountain passes. Concerning religion of people, Hindus is the obviously dominant population in most of the districts except Lahaul-Spiti and Kinnaur where Buddhists represent 62% and nearly 30% respectively.
5. Analysing occupation of people in the state, more than 60% of the population is engaged in agriculture either as cultivator or agricultural labourer. There is a significant disparity between men and women in the distribution of workforce. The number of women engaged in agriculture is almost double of that of men in some districts.
6. According to the Economic Survey 2019-20, the per capita income at current prices in 2018-19 as per First Revised Estimates (FRE) is valued INR 183,108 that indicates increase of 11% from the previous year. Advance estimates indicate increase of 6.6% in the per capita income at current prices during 2019-20. Regarding income of agriculture labours, daily wages of both skilled and unskilled labour increased sharply between 2008 and 2015. Looking into household incomes, more than 23% of rural families in the state was living below poverty line during year 2002-07.
7. According to Agricultural Census 2010-11, the land holdings of less than one hectare accounted for 69.8% of the total holdings whereas the area covered by these holdings formed only 28.6% of the total area. In sum, 88.0% of the farmers are taken as marginal or small farmers having less than

two hectares of the land. The average size of land holdings of the state was 0.99 hectares in 2010-11, in which remarkable difference can be observed between districts.

8. Literacy rate of HP is expressively higher than that of national average. Even though there is apparent difference between men and women, still the literacy of women in HP is higher than the national average of total population. Literacy of S.C and S.T population are relatively lower than that of total population in most districts.
9. HP is geographically different from most Indian states in the plains. The State is almost wholly mountainous with altitudes ranging from 350 metres to 6,975 metres above the mean sea level. Physiographically, the state can be divided into five zones: (i) Wet Sub-temperate zone, (ii) humid sub-temperate zone, (iii) dry temperate-alpine high lands, (iv) humid sub-tropical zone, and (v) sub-humid sub-tropical zone. Geological structure of the state falls into four major zones. The outer- or sub-Himalayan zone consists mainly of tertiary formations, lowest Himalayan range mainly composes of granite and other crystalline rocks, high Himalayan zone is with granite rocks lacking fossils, and Tibetan or Tethys Himalayan zone comprises the wide basin covering the Spiti valley.
10. Due to extreme variation in elevation, great diversity occurs in the land resources and utilisation of the land. Southern part of the state is characterised with intensively cultivated and moderately forested land, while northern part is represented by high proportion of pastures and other grazing land where the cultivated land and forest area is limited. Central part is relatively moderately cultivated and highly forested with a considerable proportion of pasture and other grazing lands. Cultivated area is limited to 12% of the land, with outstanding range among districts.
11. There is great diversification in climatic condition of Himachal Pradesh due to variation in elevation. Between an altitude of 400-900m, it varies from hot and sub-humid tropical in the southern low tract, while it is warm and temperate in the area between 900-1800m. Between 1800-2400m belongs to cool and temperate, and altitude of 2400-4800m is classified in cold alpine and glacial. In the state, the year could be divided into three seasons; Winter season (October to February), Summer season (March to June), and Monsoon season (July to September), which are different from most plain states in India due to shorter and less severe summers, higher precipitation, and colder and more prolonged winters. In general, although rainfall increases from south to north in HP, it decreases towards Lahaul-Spiti and Kinnaur due to the rain-shadow effect. The highest normal monthly rainfall may take place in July or August except in highland areas. Normal rainfall per year in each district is more than 700 mm/year.
12. The economy of HP has shown a shift from the agriculture sector to industries and services. The percentage contribution of agriculture in the total state domestic product has declined from 57.9% in 1950-51 to 8.4% in 2018-19. However, the growth in the state economy is still determined by the primary sector that has impact on other sectors via input linkages, employment, trade, and transportation etc. Therefore, a high priority has been accorded to the agriculture sector by the government.
13. The gross state domestic product (GSDP) of HP at constant prices (with base of year 2011-12) for the year 2018-19 achieved INR 117,750 crore with annual growth of 7.3%, and the growth rate for 2019-20 is expected to be around 5.6%. The growth of the state economy is highly supported by public administration and manufacturing, while agriculture and allied sector, a key sector supporting about 60% of the population, contributes to only 8.2% of the total GSDP
14. There are more than four lakhs of establishments that operate for economic activities in HP, out of which 81% are engaged in the rural areas. Nearly ten lakhs of persons are employed in these establishments with 76% of employment belonging to rural areas. Therefore, the development of establishments is important in the rural economy of the state. However, establishments that are engaged in the agriculture sector are limited to 7.8% of the total establishments, out of which only 4.5% is engaged in agriculture services.
15. Cooperative societies play an important role to ameliorate the socioeconomic condition of people in rural areas. HP has pioneered the cooperative movement in 1904 and 5,038 cooperatives of

various kinds are currently functioning in the state. Cooperative societies provide multi services, which include distribution of consumer goods under the public distribution system, distribution of fertilizers and other agricultural related inputs and implements, collection of milk and its marketing through milk cooperatives, advancement of loans through Primary Agricultural Cooperative Societies (PACS) and other cooperative financial institutions, marketing of agricultural and horticultural produces, production of handicraft products, fisheries, transportation services.

16. Agro-climatically the state are divided into four zones keeping in view the altitude, rainfall, and temperature: Sub-tropical Sub-mountain and Low Hills, Sub-humid Mid Hills, Wet Temperate High Hills, and Dry Temperate High Hills.
17. The state has enormous potential of water resources in the form of glaciers and rivers while ground water resources are limited. There are 800 Glaciers in the Himachal Himalayas. The total area covered by these glaciers in Satluj and Chinab basins is 2175 km². Besides the glaciers there are 2679 permanent snowfields in these basins with a total area of 1775.189 km². Most of the surface water resources of the state flow from perennial rivers originating from glaciers and flowing into Indus and Ganges basins. Major rivers are Chenab river flowing 122 kilometres covering an area of 7,500 square kilometres in HP, Ravi river with length of 158 kilometres and a catchment area of nearly 5,451 square kilometres, Beas river that flows about 256 kilometres in HP being formed by seasonal tributaries in the south, Sutlej river with catchment area of 20,000 square kilometres in HP, and Yamuna river that covers catchment area of 2,320 square kilometres in HP. These rivers are perennial and are protected by an extensive cover of natural vegetation. Increased inflow sometimes results in flood in Beas river in the month of August.
18. There are a number of small and large lakes in Himachal Pradesh; 21 major Lakes are contributing as a water reservoir. There are 128 Ground Water Monitoring Station (GWMS) in Himachal Pradesh under Central Ground water Board. Valley areas highly depend upon groundwater and exploit it through open wells, tubewells, infiltration galleries and wells. As there is an imbalance between supply and consumption of water, particularly by the poor and weaker sections of the society, traditional sources of water play a significant role. These include springs, Kuhls, Baories, Ponds, Khatries and ditches that supplement the water requirements of the rural and urban areas.

Chapter 3: Present Condition of Agriculture Sector in the Survey Area

19. The GoI sets the target of doubling farmers' income by 2022 as the national agriculture policy after the completion of the latest 12th FYP in 2017. The government emphasises improvement of trade to realise fair price for farmers and crop diversification towards high value crops. A study estimates that the area under high value crops is required to increase by 4.4% each year to achieve its contribution to double farmers' income by 2022. Moreover, 'Vision 2030' has been developed as a strategic framework for innovation-led, inclusive, and sustainable agricultural growth through improvement of productivity and competitiveness.
20. Agricultural schemes of the Central government basically provide funding resources to the state governments for specific objectives and activities, for which the state governments adopt and apply for the funding. Therefore, the funding from central schemes are utilised in convergence with state initiatives or schemes.
21. Major policies related to agriculture development in HP are "Organic Farming Policy", State Water Policy 2013", "Sustainable Development Goals (SDGs) in Himachal Pradesh". HP also publicised the following thrust areas for future agriculture development in HP identified by DoA, which emphasises the need for the diversification of crops as the firstly mentioned thrust area. There are several schemes and programmes related to agriculture, of which major 12 schemes are summarised in the report.

Thrust areas for future agriculture development in HP

- Diversification from traditional crops to commercial crops where irrigation potential has been created with promotion of organic vegetables without the use of pesticides and chemical fertilisers.

- Development of rainfed areas through watershed approach on a large scale for efficient use of natural resources availing funding under RIDF.
 - Promotion of rainwater harvesting for recharging the groundwater and checking erosion.
 - Increase in maize productivity through high yielding hybrids.
 - Adoption of precision farming practices utilising polyhouse and micro irrigation
 - Promotion of organic farming
 - Post-harvest management and efficient marketing system
 - Farm mechanisation with special reference to hill agriculture as a major thrust in the years to come, which is necessary to reduce cost of cultivation in view of high cost of labour.
 - A strong research extension interface directed towards problems-oriented research programmes.
 - Extension reforms through public-private partnership
 - Agro-processing and value addition.
 - Increase in productivity and quality.
 - Application of biotechnology in the field of agriculture.
 - Soil testing and Soil Health Cards
22. Currently “Himachal Pradesh Horticulture Development Project (HPHDP)” and “Himachal Pradesh Subtropical Horticulture, Irrigation and Value Addition Project (HP SHIVA)” are implemented as externally aided project, both of which focus on horticulture. HPHDP is a World Bank-funded project commenced in 2016 with objective of supporting small farmers and agro-entrepreneurs to increase the productivity, quality, and market access of selected horticulture commodities. The project beneficiaries include farmers and entrepreneurs in the Micro, Small and Medium Enterprises (MSME) segment, Farmer Producer Organisations (FPOs) and other value chain participants, prioritising small and marginal producers of fruit-bearing tree crops. Even though the project targets the whole state, major proportion of the interventions are to be provided in Shimla, Kullu, Kinnaur, Chamba, and Mandi districts due to the existing production potential.
23. Organisational structure and major roles and activities of relevant organisations for agriculture development are compiled in the section, which include Department of Agriculture (DOA), Department of Horticulture (DOH), State Agricultural Management and Extension Training Institute (SAMETI), Himachal Pradesh State Agriculture Marketing Board (HPSAMB), Agriculture Universities, Agriculture research institutes, Irrigation and Public Health Department, farmers organisation, and cooperatives.
24. Agriculture production data is analysed by administrative blocks, land tenure, land utilisation, district-wise agro-ecological zones, cultivated area and production. District-wise cropped area and production of major vegetables is summarised.
25. Supply Chain of Vegetables and Fruits in Himachal Pradesh: HP has been famous for apple production thanks to the relatively cool weather in the mountainous area. And vegetables are marketed to metropolitan area due to a closer distance to the Delhi. The figure below shows the distribution channels of vegetables and fruits in HP.
26. APMC market model and GOI’s Agricultural Market Reform Policy: HP has established 10 APMCs at the district level. The HPSAMB estimates that about 50% of marketed vegetables and fruits are transacted in APMC markets (mandis) in HP and transaction of seven major vegetables and apples marketed through APMC market account for 60-70% in HP. Average share of marketed amount of major products including cabbage, capsicum, cauliflower, French beans, peas, potato, tomato, and apples are assessed. Analysis of data on the Azadpur Market located in Delhi, a leading mandi in the country, indicates that most of the produce in HP are grown by controlling the harvesting time so that the produce can be marketed to Azadpur Mandi during its lean arrival season.
27. Agribusiness and Government Schemes Supporting Supply Chains: Study on networking APMC markets through eNAM (National Agriculture Market) revealed that awareness of relevant stakeholders on eNAM remains limited. Even though e-trading of agricultural produce is one of

the major strategies for market reform of GOI, it requires a steady and long-term approach to overcome emerging issues.

28. Impacts of COVID-19: HPAMB evaluates lockdown imposed by GOI has a substantial influence not only on commodity distribution and liquidity of human resources and money, but also on agricultural supply chains in HP. However, no mandi was closed due to COVID-19 related incident to date, as the supply of agricultural produce has been commenced with the issuance of curfew passes to transporters by the state authority after about one week of the lockdown. Many APMCs in HP also reported that the overall supply of agricultural produce remained stable.
29. GOI's Agricultural Market Reform Policy: Many literatures suggest that the APMC model has failed in performing the expected role as the outdated legal framework being unable to adopt to the changing social needs, and it has made a negative impact on the ability of farmers. GOI announced a new market reform policy in May 2020 and amended the following three ordinances.

The Essential Commodities (Amendment) Ordinance, 2020

⇒ Trade of essential food stuff, i.e., cereals, edible oils, oilseeds, pulses, potatoes, and onions will be deregulated. Private traders including processors will enter in the bulk trading of the food stuff. Consequently, competitiveness in the trade will increase.

The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Service Ordinance, 2020

⇒ Contract farming will be promoted in a fair and transparent manner. Farmers and private agribusiness will benefit from risk mitigation, assured returns, and standardisation of quality.

The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Ordinance, 2020

⇒ Transparent and barrier-free inter-state and intra-state trade will be accelerated through E-trading system. Farmers and private traders will enjoy a reasonable price of agricultural produce through free and competitive marketing channels.

30. Minor Irrigation and Village Infrastructure: Irrigation schemes are classified into major, medium and minor irrigation, for which irrigation department is responsible for all types of the scheme while DOA takes charge of minor irrigation schemes. Similarly in the road systems, DOA takes care of farm access road while national highways, state highways, and district roads are under Himachal Pradesh Public Works Department (HP PWD). Other rural infrastructures including water supply and electricity are well developed all over the state. There are three major types of minor irrigation system, i.e., flow irrigation, lift irrigation, and tube well irrigation system. HPCDP Phase-I developed these minor irrigation schemes of 210 sub-project in the five target districts of Hamirpur, Bilaspur, Una, Mandi and Kangra. Presently identified concerns in minor irrigation development are participation of KVA in the maintenance works as the owner of the scheme, and insufficient O&M works due to scattered and small holding of farm land.
31. Gender issues in HP are analysed in terms of rural situation of women and their workload as well as the assessment of basic indicators related to gender.
32. Through the analysis of existing studies on nutritional status of people in HP, it was revealed that micronutrient deficiency is one of the major nutritional problems. Further intervention will be considered in 1) Promotion of underutilized/ unknown crops and 2) Nutri-gardens for schools that were suggested for next generation activities in the Phase-I project.

Chapter 4: Lessons Learned from HPCDP 1 and Overall Review of DPR

33. Major lessons in project implementation learned from HPCDP Phase-I are followings;
 - Minimisation of vacant posts of extension officers
 - Minimisation of EO replacement and outsourced extension staff recruitment
 - Application of PDCA in extension activities
 - Prioritisation of area and beneficiaries for implementation of effective extension service

- Monitoring of extension activities
34. Major lessons in farming learned from HPCDP Phase-I are followings:
- Sharing data and information
 - Capacity building
 - Preparation of future plan
35. Major lessons in marketing learned from HPCDP Phase-I are followings:
- Capacity building of extension officer on practical marketing activity
 - Improvement of job profile for extension officers
 - Collection and delivery of information about potential buyers by BPMU
36. Major lessons in infrastructure of irrigation facilities learned from HPCDP Phase-I are followings:
- Additional job profile on technical extension service for water management
 - Training of farmers on water management and strengthening of KVA
 - Utilisation of checklist for water management and O&M
37. Major lessons learned from HPCDP Phase-I in food diversification / livelihood improvement / gender / social inclusion are followings;
- Involvement of extension officers
38. Findings through review of DPR are summarised as follows:
- Nomination of nodal officers for each activity to be conducted by HPCDP II
⇒ Close communication amongst HPCDP II, DOA, and other institutes concerned is expected.
 - Subjects and budgets to be flexible
⇒ All activities to be conducted in the project should be arranged, depending on the needs and requirements of the beneficiaries. If some subjects are less or more required, their activities should be flexibly modified. Meanwhile, budget should also be flexible, depending on the progress of budget consumption.
 - Necessity of stakeholders' orientation just before the implementation of the project.
⇒ It is expected that orientation of all stakeholders should be arranged before implementation of the project in order to ensure close coordination.
 - Implementors to be clarified
⇒ In DPR, implementors for some subjects are not yet decided.
 - Operation and maintenance (O&M) plan and setting up
⇒ It is necessary to prepare O&M plan to manage the facilities (irrigation facilities, MIS, etc.), farm machinery, and other infrastructure (storage, collection centre, etc.). O&M plan should be prepared before commencement of operation

Chapter 5: Proposed Subprojects and Result of Sample Survey

39. Proposed sub projects are as follows. In addition to this, other 10 sub projects with convergence with Department of Irrigation and Public Health will be targeted.

Classification of Subprojects by Each District by Type

Sr. No.	District	Number of Subproject	New			Improvement		CCA (ha)
			FIS	LIS	STW	FIS	LIS	
1	Hamirpur	23	-	21	1	-	1	307.40
2	Una	19	-	9	10	-	-	243.00
3	Bilaspur	19	-	17	-	-	2	293.00
4	Mandi	54	25	15	-	14	-	1,381.00
5	Kangra	60	12	15	-	33	-	2,289.00
6	Kullu	26	3	2	-	21	-	643.00
7	Kinnaur	3	-	-	-	3	-	19.50
8	Shimla	24	12	-	-	12	-	476.00
9	Chamba	16	12	-	-	4	-	296.00
10	Sirmour	9	6	3	-	-	-	272.35
11	Solan	22	8	7	-	7	-	579.16
12	Lahaul and Spiti	21	1	-	-	20	-	634.00
	Total	296	79	89	11	114	3	7,433.41

Source: JICA Survey Team

40. Water resources were evaluated in the preliminary assessment from verification of observation discharged data and sufficiency of observation discharge data for sub-project demand. The validity was verified after measuring the catchment area over the intake point with GIS and calculating the specific discharge based on observed discharge data and catchment area. Regarding sufficiency of the observed data, water demand in the observation month was projected through assumption of a typical cropping plan based on DPR, and water adequacy is assessed using estimated demand and observation discharge data. The result of the assessment indicates that a fresh measurement is required before the final selection of the project for the subprojects, where there is a possibility of over- or under-measured in the observation data. On the other hand, it is necessary to examine crop planning or to replace with other sub projects for the sub-projects that are evaluated as insufficient for water resources. Although district wise groundwater reports could be found, resistivity survey with subproject wise specific information must be conducted before implementation.
41. Samples survey was conducted through the interview survey to farmers and site inspection in each subproject in 30 areas covering whole 12 districts. The survey has confirmed eligibility of the proposed infrastructure improvement including 1) minor irrigation, 2) micro irrigation, 3) catchment area treatment, 4) solar pump, 5) farm access road, and 6) solar fencing.
42. Through the sample survey, information regarding landholdings, cropping pattern, economic status, assets, expectation to the project, supply of farm inputs, constraints in cultivation of food grains were obtained, which were analysed by agroecological zones.

Cropping Intensity in CCA of 30 Sub-projects

Unit (%)

Agro-ecological Zones	Rabi Season				Kharif Season				
	Wheat	Others	Vegetables	Total	Maize/Wheat:2	Others	Paddy	Vegetables	Total
Zone-1	85	10	5	100	80	10	5	5	100
Zone-2	40	55	5	100	45	0	55	0	100
Zone-3	60	35	5	100	60	0	35	5	100
Zone-4*1	0	0	0	0	10	0	90	0	100

Note:

*1: for Lahaul and Spiti with no cultivation in the Rabi season due to snowfall.

*2: Maize for Zones 1 to 3, Wheat for Zone-4

Source: JICA Survey Team

43. Marketing survey was conducted through sample questionnaire survey to analyse details of marketing activities including consumption and sales, incentives for the activities and farmers' interests towards new technologies. The issues analysed thorough questionnaires are as follows.

Items : Self-consumption and sales of major crops, buyers of farm produce, marketing places of farmers, means of transportation of farmer, market information sources of farmers, degree of interest of farmers in market information, difficulties in marketing recognised by farmers, countermeasures to address the difficulties, farmers' experience in joint marketing, popularity of joint marketing, farmers' evaluation of

joint marketing practices, reasons of unsatisfactory joint marketing, farmers' strategies to increase income from vegetables and fruits, farmers' interest in farming technologies, and farmers' strategies to increase household income

Chapter 6: Outline of the Proposed Project Scope

44. The final contents of the project scope, project implementation plan, project cost, and project evaluation described in Chapter 6 and after will be decided through discussions between JICA and DoA.
45. Approximately 40% of targeted farmland belongs to Zone-1 and currently, grains with small amount of vegetables are produced under rainfed condition. The current grain yields in Himachal Pradesh are 1.80 ton/ha for paddy, 1.90 ton/ha for maize and 1.80 ton/ha for wheat. These are low compared with the average yield in India, namely, 2.43 ton/ha for paddy, 2.62 for maize and 3.05 for wheat. Although Himachal Pradesh State is a mountainous region and there are some disadvantages compared with the mainland, there might be ample room for productivity improvement of cereals through supplying irrigation water, procurement of better agricultural materials and acquiring better cultivation skills. Tomatoes, capsicum, beans, okra, onion and potato, which were cited as high-value ones for crop diversification in the sample survey, are more profitable than conventional crops of cereals. Strategies to increase the level of income by improving productivity of cereal then converting farmland to vegetable without reducing its production amount might be reasonable and can be effective.
46. On the other hand, since vegetable cultivation is popular in Zones 2 to 4 area, a slightly different strategy may adopt in those areas. Although the productivity of these vegetables is currently high compared with the average in India, there is a large seasonal price fluctuation within the state. In order to achieve income increment, the project encourages qualitative changes in the current vegetable cultivation such as promotion of off-season cultivation, introducing high-valued new crops and/or changing way of post-harvest handling and marketing.
47. Based on the evaluation of the existing crop, agro-ecological zone-wise strategic crops are summarized as follows.

Strategic Crop to be Promoted in the Project

Cropping Season	Agro-Ecological Zones			
	Zone-1 (240m to 1,000m)	Zone-2 (1,001m to 1,500m)	Zone-3 (1,501 to 3,250m)	Zone-4 (over 3,250 m)
Kharif	Okra Capsicum Cucurbits Tomato Beans	Potato Capsicum Tomato Onion Beans Cabbage Cauliflower	Tomato Cabbage Cauliflower Pea	Pea Cauliflower Cabbage Potato
Rabi	Onion Potato Cauliflower	Potato Capsicum Onion Cauliflower Pea Beans	Cabbage Cauliflower Pea Potato Garlic Onion	Pea Cauliflower Cabbage Potato

Source: JICA Survey Team

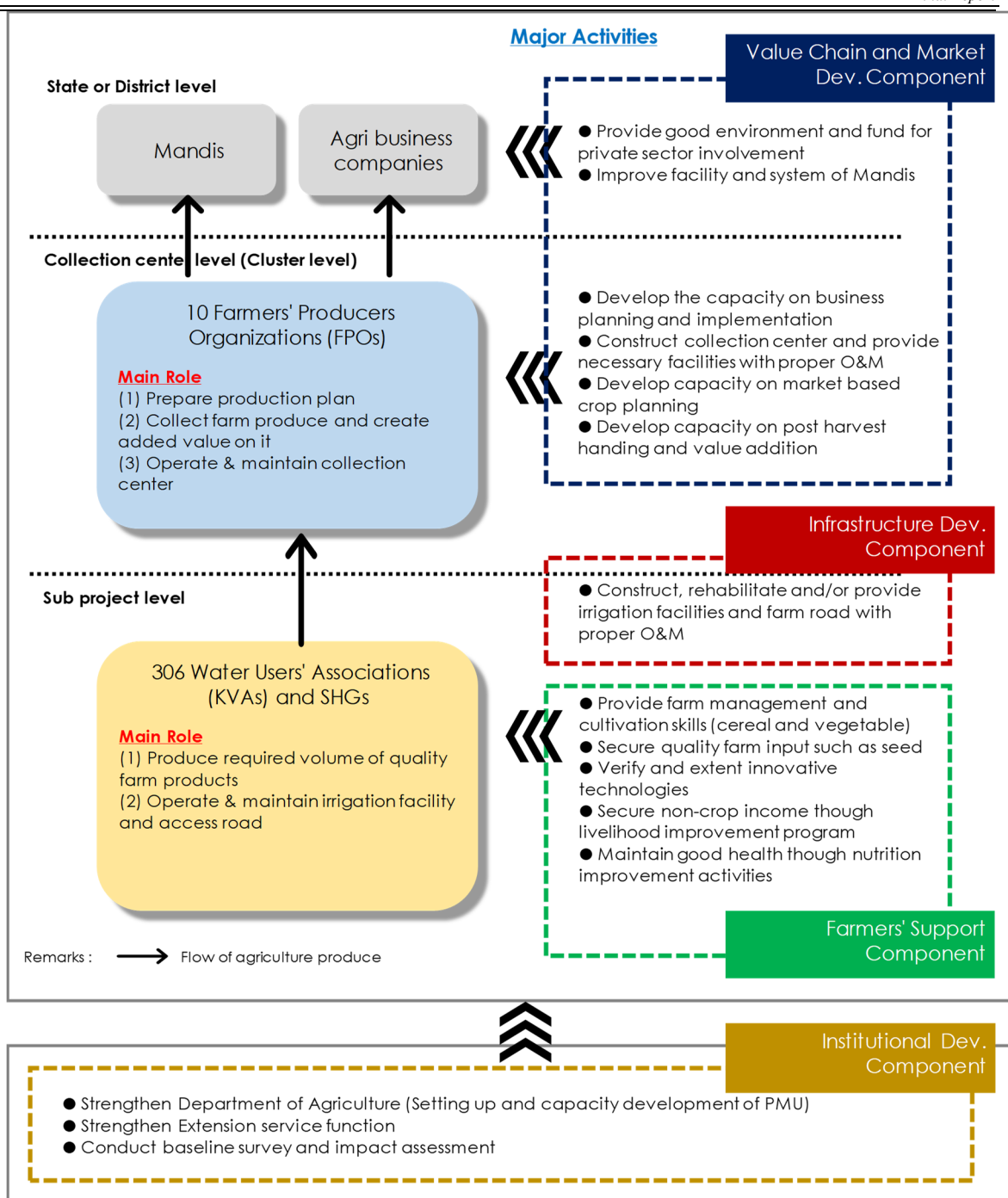
48. The target number of farmers in the 306 subprojects is 25,500 while the target irrigation area is 7,933 ha. The farmland targeted by the project is about 35% of the farmland owned by the above farmers. The area is 0.35 ha/farmer on average. The scenario of the crop diversification plan in the target area aimed at by the project is as follows.

Crop Diversification Scenario

Items	Season	Crop	Unit	Before Project (Condition)		After Project (Condition)	
Cultivation Area	Rabi	Wheat	ha	6,164	(Rainfed)	4,237	(Irrigated)
		Vegetable	ha	1,063	(Rainfed)	3,370	(Irrigated)
		Fallow	ha	707	-	327	-
		Total	ha	7,934	-	7,934	-
	Kharif	Maize	ha	5,806	(Rainfed)	4,083	(Irrigated)
		Paddy	ha	326	(Rainfed)	228	(Irrigated)
		Wheat	ha	49	(Rainfed)	49	(Irrigated)
		Vegetable	ha	1,465	(Rainfed)	3,574	(Irrigated)
		Fallow	ha	287	-	0	-
		Total		7,934		7,934	
Yield Target of Major Crops	Tomato	ton/ha	16.0	(Rainfed)	40.0	(Irrigated)	
	Cauliflower	ton/ha	9.3	(Rainfed)	23.5	(Irrigated)	
	Pea	ton/ha	5.6	(Rainfed)	12.6	(Irrigated)	
	Potato	ton/ha	6.6	(Rainfed)	20.0	(Irrigated)	
	Wheat	ton/ha	1.8	(Rainfed)	2.9	(Irrigated)	
	Maize	ton/ha	1.9	(Rainfed)	2.7	(Irrigated)	
	Paddy	ton/ha	1.8	(Rainfed)	2.9	(Irrigated)	

Source: JICA Survey Team

49. As the new agricultural ordinances come into force, Himachal Pradesh, which is dominated by smallholders as mentioned above, will have a risk for inefficient trade under liberalisation of agricultural marketing. The additional costs due to inefficient distribution are burdened by small-scale producers who do not have negotiating power and farmers may not be able to enjoy the appropriate benefits of crop diversification. In addition, individual trade with small-scale farmers may be unattractive to distributors or collectors, which narrow the options of farmers for selling their farm produce. It is therefore that the organisation and strengthening of Farmers' Producer Organisation (FPO) tried in HPCDP I will be continued in HPCDP II. It is assumed that nearly ten FPOs will be formed for each collection centre to be constructed, and FPO will take the initiative in post-harvest processing and function as an interface between distribution and production. If 306 subprojects will be divided by ten FPO, one FPO will cover 30 subprojects and 750 (ha) production areas in calculation. One Krishak Vikas Association (KVA) will be formed in each subproject to take a key role in the production and operation and maintenance (O&M) of the rural infrastructure to be constructed in the subproject level. Although one FPO covers average 30 KVAs and 2,400 farmers in calculation, the FPO will be operated by selected 300 to 500 motivated farmers. The DPR proposes four components, namely: (1) infrastructure development component, (2) farmers' support component, (3) value chain and marketing development component and (4) institutional development component. Some of these activities are targeted at FPOs responsible for marketing activities and some activities are targeted at KVAs responsible for production. It also includes activities targeting Mandis and the private companies that are responsible for the distribution and processing of products. The main activities included in each component are organised as shown in the figure below.



Source: JICA Survey Team

Overall Frame of the Project

50. Contents of Infrastructure Development Component

The content of the DPR proposal was confirmed through a sample survey regarding its necessity. Considering the results in HPCDP I, the content of the proposal under DPR is generally valid and will be the basic infrastructure to support improving farm income through crop diversification. On the other hand, a preliminary evaluation of water resources resulted in some questions on the observed flow rate by DoA for 20 out of 296 subprojects. Regarding these 20 subprojects, it is necessary to check the flow discharge at the intake point again before making the final section as a project target. The summary of infrastructure development component is shown below.

Contents of Infrastructure Development Component

Sub components	Description
Infrastructure Development for sub-projects	
Minor Irrigation	<Scheme > New: FIS 79 sites, LIS 89 sites, STW 11 sites. Improvement: FIS 114 sites, LIS 3 sites. <Main Component> Water Harvesting Structure 55 No., Percolation Well 31 No., Pump House 101 No., Rising Main 63,280 m, Main Delivery Tank 105 No., Distribution System (HDPE pipe) 715,240 m, Out Let Chamber 8,456 No., Main Channel 327,100 m, Distribution Channel 167,500 m, Supply of Power 103 No., etc.
Micro Irrigation Schemes	For LIS & TW - Drip : 92 ha (5% of CCA) - Sprinkler : 184 ha (10% of CCA) For FIS - Drip : 280 ha (5% of CCA) - Sprinkler : 280 ha (5% of CCA)
Catchment area treatment	Wire Crates: 189 No. Silt Retention Structure: 204 No.
Provision of Solar powered pumping machinery for lift irrigation and STW	83 sites <Main items> Solar panel with supporting frame, pump, Motor, Electrical Panel, Installation of electric devise and wires, etc.
Farm access roads	Cement Concrete Road W= 2.0 - 4.0m, L=62.4 km
Solar/ electric fencing for protection of vegetables on cost sharing	L= 293.22 km * The project share 90 percent out of total cost and beneficiary share 10%.
Crop Diversification through Convergence in created irrigation potential of irrigation Schemes of IPH/DOA	
Improvement of existing Irrigation schemes for distribution system	Rehabilitation of distribution system for 500 (ha) in 10 Sub projects Formation of canal Rehabilitation of related structure Rehabilitation of inspection road
Micro Irrigation Schemes	Provision of drip and sprinkler irrigation system for 100 (ha)
Others	
Miscellaneous of above works (Infrastructure development support)	Provision of fund to KVA for minor repair work and necessary training on capacity development for O&M
SID	Preparation of Detailed Project Report for infrastructure development works for 306 sub projects

Source: JICA Survey Team

51. Contents of Farmers' Support Component

The farmers' support component is an important activity toward the realisation of the crop diversification scenario shown above. The component includes formation and strengthening of KVA, vegetable promotion, research and development (R&D) support by strengthening State Agriculture University (SUA), innovative activity, livelihood support activity and nutrition improvement. The approach and contents of these sub-components are summarised below.

Contents of Farmers' Support Component

Sub component	Description
Formation and Strengthening KVA	
Awareness Camp involving Community	1) Conduct sensitization workshop (one time for each sub-project) 2) Nominate candidates of community motivator

Formation and formalization of KVAs	Workshop of group to develop objectives and norms: twice each sub-project Conduct the workshop to formulate the KVA as follows ; 1) Introduce advanced WUA activities in and out of India to understand roles and responsibilities of WUA, 2) Discuss the articles of incorporation and general rules of KVA among the member based on the regulation imposed by society act in HP, 3) Elect of management committee member of KVA, 4) Prepare necessary document for registration, 5) Discuss and aware the importance of O&M of rural infrastructure, 6) Conduct exposure visit of MC members to well functioning Water Users Association and farmers organization in HPCDP I.
Capacity development of KVAs for O&M Management	Workshop of group to develop objectives and norms: twice each sub-project 1) Conduct workshop to discuss principles and practices of irrigation and water management, 2) Conduct training on water use planning, 3) Conduct training to MC Members on participatory management, 4) Conduct training on accounting principles and practices; accounts, bookkeeping, financial audit and financial disclosers, 6) Training on credit management.
Vegetable Promotion	
Incubation and capacity development of community motivators	Engagement of Community Motivators: 306 x 2 Target for training: 306 sub-projects Conduct capacity development training and exposure visit Provision of salary for 612 person for 8 years
Farm Economy Management, Training on farm management by farm type (advanced, intermediate and conservative)	Intensive training (1st year) / Follow up training (2nd to 4th year) Target: 306 sub-projects i) Orientation & Need Assessment ii) Training on farm management and Bookkeeping iii) Workshop of Farmers Group on cropping pattern arrangement
Training cum method demonstration on Cultivation Practice of vegetable crops	Conduct training and field demonstration (2crops x 8 or 16 demonstrations x 4 seasons) i) Training on overall cultivation management of vegetables 306 sub-projects ii)Promotion of organic farming: 10 sub-projects to be selected
Food Grain's Productivity Training & demonstration	Conduct training and field demonstration (2 crops x 2 demonstrations x 4 seasons in each sub-projects) i) Training on overall cultivation management of food grain 306 sub-projects
Provision of Farm Machinery	•Providing support to farmers on cost sharing basis (50:50) project share 50% Small and medium 4 wheel tractors (below 20hp) Attachment of small and medium 4 wheel tractors (below 20hp) Small equipment such as knapsack sprayers
Provision of poly houses & poly tunnels	•Training and demonstration(low tunnels) for vegetable seedlings (4 units x 306 sub-projects) •Installation of walk in tunnels(10mtsX4 mts=1 unit): 1 unit in the sub project having CCA <25 ha(109sub-projects x 2nos.) •Installation of walk in tunnels(10mtsX4 mts=1 unit): 1 unit in sub projects having CCA >25 ha (197sub-projects x 4nos.) •Installation of poly houses including MIS with covering 105sqm (50 nos., 5 nos. x 10 FPOs) •Small poly houses in kitchen garden on cost sharing basis 85:15: 105 sqm poly house (306 nos.)
Program for Next Generation	•Enlightenment of students for promotion of crop diversification i) School Students: 70 schools ii) Young Farmers: 120 youth Undertake farming as income generation enterprises Awareness campaign / Workshop type discussion / training and exposure visit regarding industrialization of agriculture
Other activities	
R&D support	•Sustainable small-scale hydroponic cropping of vegetables for limited resources
	•Multi-location testing of CMS based hybrids of cauliflower in Himachal Pradesh
	•Multi-location testing of GMS based bacterial wilt resistant hybrids of chili in Himachal Pradesh

	<ul style="list-style-type: none"> •Generation of double haploid through induced androgenesis in head cabbage (Brassica oleracea var. capitata L.) •Multilocal testing and validation of newly developed bacterial wilt resistant and high yielding bell pepper lines/hybrids in H.P. •Multilocal testing and validation of newly developed yellow vein mosaic virus resistant and high yielding okra lines/hybrids in H.P. •Development and promotion of management technology against insect-pests of brinjal •Management of root-knot nematode, Meloidogyne incognita in cucumber under protected cultivation •Assessment, validation and refinement of disease management technology for vegetable crops •Enhancing rice production in high-altitude areas of Himachal Pradesh by development and popularization of high yielding, cold tolerant japonica rice varieties through farmers' participatory approach. •Genetic amelioration of Kala zeera (Bunium persicum Boiss) using tissue culture/micropropagation approach •Popularization of potential A B C crops of North Western Himalayas as vegetable and seed under organic and natural farming conditions through participatory plant breeding. (A B C= Amaranthus, Buckwheat and Chenopodium.)
Infrastructure development at SAU for vegetable seed production	<p>1 no. <Main Items> Development of area (285,714m²), Architect (Brick wall ,1floor, 213m²), Farm Road with bearing Coat (w= 2.40m, L=3.0km), Irrigation Rising main and Distribution system, RCC water storage tank (500m³), RCC distribution water storage tank (50m³)</p>
2.4 Innovative activities	
Establishment of center of excellence for vegetable nursery production	<p>Center of excellence (2 nos) Hi-tech green house with covered area of 560 sqm with fan & pad system Shade net house with covered area of 250 sqm</p>
Trial for soil less cultivation/Fan Pad GH with vertical system	<p>1 no. Fan & Pad Green House with vertical system 250sqm</p>
Provision of tubular structure shade net houses	<p>50 nos Tubular Structure Shade Net Houses for Vegetables Production One Poly house with shade net with covered area of 100 sqm</p>
Provision of plastic mulching material	<p>306 sub-projects 2,000sqm per sub-project</p>
Provision of Anti- Hail nets in hail prone areas	<p>153 sub-projects (50% of 306 sub-projects), 500sqm per sub-project</p>
Livelihood support activities for on /off farm activities	
Formation and formalization of SHGs	<p>Conduct sensitization workshop with following subjects for 306 sub projects 1) Orientation of farmers to develop objectives and strengthen consciousness 2) Training for SHG members on role and responsibility of office bearers and introduction of key topics for farmers group. 3) Exposure visit of advanced farmers organization in HP state</p>
Mushroom cultivation on cost sharing basis 80:20	<p>1) Conduct awareness workshop on mushroom and select the beneficiaries 2) Provide equipment and material of mushroom for 700 farmers (50 farmers per BPMU x 14 BPMUs =700) 3) Provision of necessary training on cultivation management and marketing</p>
Raring of honeybees on cost sharing basis 80:20	<p>1) Conduct awareness workshop on honey bees and select the beneficiaries 2) Provide equipment and material of honey bees for 280 families (10 colony apiary per unit / 20 farmers per BPMU x 14 BPMUs =280 farmers (units)) 3) Provision of necessary training on cultivation management and marketing</p>

Dairy Farming on cost sharing basis 80:20 (2 cows/ Buffalos per unit)	1) Conduct awareness workshop on dairy farming and select the beneficiaries 2) Provide equipment and material of dairy farming for 140 units (2 cows/buffaloes per unit) / 10 farmers per BPMU x 14 BPMUs =140 units 3) Provision of necessary training on cultivation management and marketing
Back yard poultry on cost sharing basis 80:20 (50 birds Per unit)	1) Conduct awareness workshop on back yard poultry and select the beneficiaries 2) Provide equipment and material of back yard poultry for 306 units (50 chicks per unit) 3) Provision of necessary training on cultivation management and marketing
Service Sector Training (1,200 nos.)	Conduct the vocational training for 1,200 farmers on the following subjects 1) Motor/Farm machinery/ Scooter Mechanic 2) Hospitality & Tourism 3) Mobile Repair 4) Pumping-with special focus on HDPE/GI Pipes and Accessories 5) Driving of farm machinery/commercial vehicles 6) Electrician 7) Computer & Internet for Online Trading, Banking, Correspondence, Record Keeping, etc. 8) Bamboo Craft 9) Tailoring/Knitting
Promotion of Shiitake Mushroom Cultivation	1) Manufacturing sawdust blocks (Target 36,000 blocks) 2) Selling sawdust blocks to farmers 3) Training of farmers on Shiitake cultivation and processing 4) DOA's Shiitake disseminator: 3 staff 5) Market research to be conducted by Shiitake expert of PMC, and marketing officers of SPMU and DPMUs with farmers groups
Promotion of on farm of fish culture	1) Conduct awareness workshop on fish culture and select the beneficiaries 2) Development and management of fish culture (50 m ³ , cost sharing, 50 units) 2) Provision of necessary training on cultivation management and marketing
2.6 Nutrition Improvement	
Dissemination of recipes using nutritious ingredients	1) Dissemination of recipes prepared in TCP 2) Collect cooking report from the SHGs 3) Conduct awareness program for dissemination of the knowledge on nutrition improvement
Promotion of school garden	1) Establish school garden at selected village (24 nos) 2) Provision of necessary input for cultivation of the vegetable 3) Conduct field day training with stakeholders in the school 4) Awareness workshop for nutrition improvement
Dissemination of kitchen garden for nutrition improvement	1) Cultivation training on selected vegetable with cultivation manual 2) Field day training 3) Provision of seed and other necessary input

Source: JICA Survey Team

52. Contents of Value Chain and Market Development Component

Summary of the value chain and market development component is as follows.

Contents of Value Chain and Market Development Component

Sub-components	Description
Bringing FPOs up as a business entity	<p>< Trainings ></p> <ul style="list-style-type: none"> • Concept of agricultural cooperative movement • Organisation management • Business management (business planning, financing, accounting, documentation and filing, computer operation and communication, etc.) • Government supporting schemes and a way of access • Agricultural marketing and market-oriented cropping • Post-harvest management of agricultural produce • Quality standards, grading and evaluation of agriculture produce • Market information system (eNAM, EMI cell of HPSAMC, etc.)

	<ul style="list-style-type: none"> • Lows and regulations related to agricultural marketing business • Study tour to advanced FPOs and private enterprises
Establishment of FPO's collection centre	<p><Facility construction with equipment> Post-harvest operation hall, storage, handling tables, conveyors for grading, washing machine, pe-cooling cabinet, weighing and packing machine, office, computer set, vehicle (truck), etc. <Initial Handover Training> O&M of facilities and equipment</p>
Matching FPOs with agribusiness operators	<p><System development and on-the-job-training></p> <ul style="list-style-type: none"> • Registration of potential FPOs & agribusiness operators including CAs (periodical updating) • Disseminating information on potential FPOs & agribusiness operators (periodical issue/updating of newsletters, brochures, website, SNS, etc.) • Providing consultation services to potential FPOs & agribusiness operators to enter a joint business operation (contract farming, JV, etc.) • Organising investment fairs, matching meetings and site-visit tours • Providing intermediary services to facilitate a joint business operation between FPOs & agribusiness operators • Introducing possible government schemes supporting a joint business
Facilitation of pilot business trials	<p><System development and on-the-job-training></p> <ul style="list-style-type: none"> • Introducing a local counterpart entity/agency for managing a pilot trial • Providing supporting services to facilitate a pilot trial (Government permission and approval process, license process, site arrangement, etc.)
Modernising facilities and equipment in Mandis	<p><Facility construction of 13 mandis (APMC) ></p> <ul style="list-style-type: none"> • Jassor (Kangra), Passu (Kangra), Chauribihal (Kulu and Lahaul and Spiti), Patlikuhah (Kulu and Lahaul and Spiti), Khegsu (Kulu and Lahaul and Spiti), Takoli (Mandi), Bhattakuffar (Shimla and Kinnaur), Tapri (Shimla and Kinnaur), Ghandoori (Sirmaur), Khairi (Sirmaur), Solan (Solan), Vaknaghat (Solan), Kunihar (Solan)
Empowerment of CAs	<p>< Trainings></p> <ul style="list-style-type: none"> • Concept of fair trading and necessary skills of auction management • Laws and regulations related to agricultural marketing business • Quality standards, grading and evaluation of agricultural produce • Post-harvest management of agricultural produce • Sanitary management of market facility and agricultural produce • Market information system (eNAM, EMI cell of HPSAMC, etc.) • Business management (business planning, financing, accounting, documentation and filing, computer operation and communication, etc.)

Source: JICA Survey Team

53. Contents of Institutional Development Component

Regarding the Institutional Development Component in the DPR, three activities are proposed, namely: (1) Strengthening of DoA, (2) Strengthening of Extension Service Function, and (3) Baseline Survey and Impact Assessment. As mentioned above, the contents of Institutional Development Component should be decided after considering the lessons learned in HPCDP I, keeping in mind to build a system and mechanism that can sustain the project results even after the project completion. Strengthening of DOA is an activity mainly for efficient and smooth project management, including establishment of PMU and capacity building of staff. The Strengthening of Extension Service Function is not specific to the project, but aims to raise the level of the technology extension system of the entire DoA. Since this project is implemented in Society Mode, it will be implemented independently of the usual government extension activities. Therefore, the necessary measures are required to smoothly transfer the project results from PMU to DoA during and after project implementation. These are the establishment of mechanism for timely sharing of information and knowledge, training for DoA staff similar to the training for PMU and so on.

Contents of Institutional Development Component

Sub-components	Description
Strengthening of DOA	
Recruitment of PMU Staff (Out-Source)	The following number of staff will be recruited •State PMU: 27 staff •District PMU: 64 staff •Block PMU: 294 staff
Capacity Development of Project Staff on PDCA Cycle	Target extension officers in all staff of PMU •Conduct orientation meeting to clarify project objective, outputs, approach of work, role of extension officers •Awareness on project cycle management and community participation in the planning process •Awareness on project monitoring and evaluation •Exposure visits of PMU staff (Other States) •Conduct peer learning workshop to disseminate PDCA cycles to all extension officers in 12 DDAs •Organizing periodical review meetings, workshops, etc. to learn success stories within and outside the states
Review of overall project implementation plan	1) Review of DPR and prepare detailed plan of operation 2) The plan will be reviewed every year
Preparation, monitoring and update of supply chain and market development plan	1) Prepare 10 supply chain and market development plans. The plan includes the following items. • Area of each FPO to be covered • FPO establishment and capacity development schedule • Location and construction schedule of collection center • Information on available Agri business operators in the respective FPO area • Overall infrastructure and capacity development schedule of sub-projects in the respective FPO area 2) Monitor the progress of planned activities and make necessary update yearly
Preparation, monitoring and update of crop diversification plan for each sub-project	1) Selection of strategic crop 2) Support for preparation of cropping plan 3) Production and marketing plan based on cropping plan 4) O&M plan for infrastructure
Establishment of MIS &GIS and Monitoring System and Procurement of ICT related equipment	Establish information platform for activity progress management Establish KVA and FPO registration system in PMU and DDA The procurement of following items for PMUs PC: 492 nos. MFP: 38 nos. Camera: 20 nos. Projector: 20 nos. Audio visual devices: 20 nos. UPS: 124 nos.
Construction of Training Centers	5 Nos. (New construction at SPMU and 4 DPMU level, RCC Building, 4 floors, 200m ² x 4)
Procurement of Equipment and Tools to PMU	1) Rented accommodation for office space with Furniture & office-equipment 2) Arrangement of transport facilities at PMU (multi utility vehicles & sedan or equivalent) Procurement of new vehicles & motor cycles ,hiring up of vehicles including operational cost.) 3) Procurement of visual aids extension equipment and survey and design equipment at PMU 4) Soil test kit Procurement of 3 vehicles (SPMU 3) and hiring of 24 No. MUV (SPMU ,DPMU 08, BPMU 14), 40 no Motor cycles
Strengthening of Extension Service Function	
Preparation of Information, Education and	1) Disseminate crop diversification and methodologies employed under the project within the state with followings •Posters: 306 sub-projects

<p>Communication (IEC) Material for Dissemination</p>	<ul style="list-style-type: none"> •Wall writings & fixing of posters: 306 sub-projects •Street plays on present situation and improvement: 306 sub-projects •Publication of handouts and manuals: L.S. •Preparation of video programs: 16 nos. •Dissemination of technology through demonstration: 1,184 nos. •Farmers' fair in each Cluster: 10 nos. •Display of shows in project villages: 306 sub-projects <p>2) Examine and discussion on the establishment of FPO based extension system 3) Preparation of action plan for dissemination of FPO based extension system in DDA</p>
<p>Capacity Development of Agriculture Extension Staff</p>	<p>Target extension officers in DPMUs and BPMUs SMS:4 staff, ADO:16 staff, AEO: 42 staff, AE: 32 staff, AO: 18 staff Extension officers in SMS offices of DDA: SMSs, ADOs, AADOs, AEOs Conduct the following trainings for Agriculture Extension Staff under DDA</p> <ol style="list-style-type: none"> 1) Farming practices on common and exotic vegetables with field exercises 2) Protected cultivation with field exercises 3) Integrated Pest Management 4) Integrated Nutrition Management 5) Soil analysis and soil health management 6) Market-led extension 7) Extension management and HRD skills 8) Office procedure / record keeping / PDCA 9) Gender sensitization 10) Food diversification / nutrition improvement 11) Other subjects depending on needs / requirement of extension officers 12) Exposure visits
<p>Capacity Development of Engineering Staff</p>	<p>Target trainees i) Engineering staff in DPMUs and BPMUs ii) Staff of SDSCOs in DDAs Conduct the following trainings for engineering staff under DDA</p> <ol style="list-style-type: none"> 1) Application of the Guideline and Check list which are prepared in HPCDP I project. 2) Data preparation and record keeping of pre-condition of each sub-projects. 3) Design of Pumping machinery. 4) Collaboration with extension officers for O&M activities such as supervision of Micro Irrigation System installation and selection of sprinkler type and drip tube type. 5) Organization of design documents such as design drawings and properties of installed facilities with extension officers and in-charge of MIS and GIS for future O&M.
<p>Strengthening of Research- Extension-Farmer Linkages and joint visits</p>	<p>25 meetings for exchange of opinions, views, trouble shooting, etc. to be arranged twice a year in different District</p> <ul style="list-style-type: none"> •To disseminate proper techniques to farmers, •To improve constraints as well as the current situation on vegetable cultivation, etc.
<p>International/national/state level workshop/seminars</p>	<ul style="list-style-type: none"> • Dissemination of crop diversification in the project <p>International seminar: 2 times National seminar: 4 times State level workshop: 16 times</p>
<p>Overseas Training , Exposure/Study visits of Project staff and other stakeholders</p>	<p>10 times with following subjects</p> <ul style="list-style-type: none"> - JICA Initiative - Production and primary processing - Extension and agricultural marketing / value addition
<p>Upgrading of infrastructure of State Agriculture Management and Extension Training Institute (SAMETI)</p>	<p>Construction of new hostel for resource persons / trainees to training programs</p> <ul style="list-style-type: none"> •No. of hostel: One •Building area:197 sq-m •Total floor area:788 sq-m •No. of floors: 4 floors

	<ul style="list-style-type: none"> •No. of rooms: 10 rooms with bath rooms (20 persons) •Other facilities: Kitchen, dining, etc.
Baseline Survey and Impact Assessment	
Conduct baseline survey	Household survey in approximately 30 sites (10% of 296 candidate Sub-project sites in the short list), samples in each site would depend upon the number of households in each sub project
Conduct mid-line survey	Household survey in 13 sites (10% of implemented sites), 20 samples in each site (260 samples)
Conduct end-line survey	Household survey in 8 sites (5% of implemented sites), 20 samples in each site (160 samples)

Source: JICA Survey Team

Chapter 7: Implementation Plan

54. Followings are key organization for implementation of the project

Department of Agriculture (DoA)

The Department of Agriculture (DoA) is the nodal agency for the HPCDP II. It shall work as a channel between the Executive Committee and the Project Management Unit (PMU) in respect to all necessary communication, correspondence and related matters regarding the Project in relation to communication/ note/ report, etc., sent and received by the PMU. Whereas in some aspects like reimbursement claims and routine budget forecast, the PMU shall communicate directly with the Japan International Cooperation Agency (JICA).

Governing Council

The PMU works under the overall supervision and guidance of the Governing Council formed by the Government of Himachal Pradesh (GoHP). The Governing Council is presided by the Minister of Agriculture, GoHP; and the Principal Secretary, Agriculture, GoHP is the Vice-President of the Council. The Project Director of the PMU is the member secretary.

Executive Committee

The affairs of the PMU are administered by an Executive Committee under the Governing Council. The Executive Committee is responsible for overall administration, monitoring, technical quality control and formulating guidelines for operation and function of the PMU. The Executive Committee is chaired by the Principal Secretary, Agriculture, GoHP. The Project Director of the PMU is the member secretary.

Finance Committee

In addition to the Executive Committee, there is a Finance Committee, which shall oversee and guide all matters relating to financial sanction. Project Management Unit (PMU)

Project Management Unit (PMU)

The State PMU Office, which is the Central Office of the PMU, is situated in Hamirpur, District Hamirpur, Himachal Pradesh. The State PMU Office is responsible for the overall management of HPCDP II. District Level PMU (DPMU)

There are four District PMU Offices: (i) District PMU Office in Hamirpur District covering three districts, namely: Hamirpur, Bilaspur, and Una; (ii) District PMU Office in Palampur District covering two districts, namely: Kangra and Chamba; (iii) District PMU Office in Mandi District covering three districts, namely: Mandi, Gohar, Kullu and Sarkaghat; and (iv) District PMU Office in Solan District covering four districts, namely: Sirmaur, Solan, Shimla, and Kinnaur. The District PMU Offices are responsible for management of district level activities of HPCDP II in their respective district jurisdictions.

There are 14 Block PMU Offices: (i) one each in Hamirpur, Bilaspur and Una; (ii) four in Mandi, namely: Mandi, Gohar, Kullu and Sarkaghat; (iii) four in Palampur, namely: Palampur, Dehra, Dharamshala and Chamba; and (iv) three in Solan, namely: Solan, Nahan and Rampur. The Block PMU Offices are responsible for supervision of field level activities of HPCDP II and providing technical advice in their respective district jurisdictions.

Project Management Consultant (PMC)

To reinforce the implementation capacity of the PMU as well as to ensure technical assistance and quality control of the Project, a team of consultants will be procured by the PMU and will be referred to as Project Management Consultant (PMC). The PMC will assist the PMU in the improvement of processes and procedures for project implementation at the state, district and block levels.

55. Procurement by the PMU for HPCDP II can be classified into: (a) construction works, (b) supply of materials or goods, which also include durable items such as office furniture, survey, design equipment and consumables such as stationeries, etc., and (c) hiring of services including consultancy. Prior to procuring construction works, goods or services, specifications, plan, drawing, design, special requirement or other description pertaining thereto shall be prepared by the PMU. The description referred to shall be based on international standards, where such exist; otherwise, on national technical regulations, recognised national standards or codes.

56. Implementation Plan of Infrastructure Development Component

The preparation of application from Krishak Vikas Association (KVA), preparation of Minimum Project Report by PMU and selection of subprojects have already been completed by DoA and PMU of the HPCDP I by the time when the preparatory survey commenced in July 2020. After starting of the Project, PMU prepares a Detailed Project Report (hereinafter “DPR”) of each subproject and offer tender through e-tendering system after the approval of the DPR by PMC. Construction work will be supervised by BPMU engineering staff and they will control the quality of works of the contractor using the “Quality Assurance & Control Manual”, which will be prepared by PMC. Since tendering will be offered based on a subproject wise, the number of packages will be 306. In case of provision of micro irrigation system and solar fencing, BPMU selects an empanelled service provider in DoA and the service provider conducts field survey, identifies needed materials to be installed to correspond with the field condition and prepares cost estimate. After approval of those documents by DPMU, DPMU will issue an award letter to the service provider for implementation. The service provider has the responsibility of installing the micro irrigation system and solar fencing. This procedure is summarised as follows:

From the experience of HPCDP I, PMC had better monitor the supervision of installation of micro irrigation system since the extension officer does not have an engineering background and sometimes it is hard to judge whether or not micro irrigation system has been installed properly.

57. Implementation Plan of Farmers’ Support Component

As described in Chapter 6, farmers’ support component includes formation and strengthening of KVA, vegetable promotion, research and development (R&D) support with strengthening of State Agriculture University (SUA), innovative activity, livelihood support activity and nutrition improvement. Formation and strengthening KVA will be carried out by BPMU agricultural extension officers. The awareness campaign to be implemented at the beginning of the activity will be conducted on village basis and the training will be conducted to KVA. The teaching materials used for the training will be prepared by DPMU with the support of PMC, and DPMU staff will carry out Training of Trainers (TOT) to the person in-charge of BPMU based on the material. Regarding vegetable promotion activities, BPMU will directly conduct trainings and field demonstrations. However, in case of the staff’s on-site operation exceeds three days a week, the work will be outsourced to KVK and State Agriculture Universities (SAU). In addition, by using Farmers’ Producer Organisation (FPO) to arrange training, distribution of materials and selection of beneficiaries, workload of BPMU extension workers can be reduced for efficient implementation. Regarding the provision of agricultural machinery and materials, BPMU will

contract with the supplier for procurement and the supplier also implements the installation and O&M guidance. The next generation program will also be outsourced to a local non-governmental organisation (NGO) and BPMU will control the work quality. Regarding R&D Support and SAU seed field maintenance, funds will be provided to SAU based on the created DPR, SAU will carry out the project, and SPMU will manage the results. For activities related to innovative activity, DPMU contracts with local suppliers and contractors to construct and install the facility. Livelihood improvement and nutrition activities will be carried out by BPMU for Self Help Group (SHG) identification and capacity building, and specific livelihood improvement activities will be outsourced to local NGOs. In addition, related departments such as DoH, DoF, and DoAH will provide technical advice regarding activities as appropriate and PMC will provide technical guidance support to Shitake Cultivation Training Center (SCTC) for the shiitake mushroom business.

58. Implementation Plan of Value Chain and Market Development Component

Activities that will make FPO as an economic entity will be entrusted to National Bank for Agriculture and Rural Development (NABARD), Small Farmers Business Consortium (SFAC) or other qualified service providers, which have a track record of launching and supporting FPO. PMC provides technical advice on how to proceed the incubation of FPO with training material. The construction of collection centre will be carried out by the local contractor based on DPR created by PMC. BPMU engineers will supervise the construction work. The facilities required for collection centre will be procured through local supplier based on the contract with DPMU.

Matching with private companies and pilot business trials will be conducted by FPO personnel in SPMU and supported by PMU. Since the pilot business trial will be conducted at the Centre of Excellence established in the project, the KVK and SAU will also be involved in the activities. Activities to renovate the market will be entrusted to HPSAMB with the necessary funds after SPMU approves the DPR created by HPSAMB. HPSAMB will use these funds to perform renovation work in accordance with DPR. The construction will be carried out by a local contractor and HPSAMB engineer or hired engineer will supervise the construction work. The PMC will provide technical assistance as needed.

Capacity development training on commission agent will also be entrusted to HPSAMB as well after SPMU approves the DPR created by HPSAMB. HPSAMB employs local consultants (such as National Bank for Agriculture and Rural Development Consultancy Services (NABCONS)) who are familiar with marketing and crop distribution and sales systems. PMU assist in the preparation or improvement of training materials.

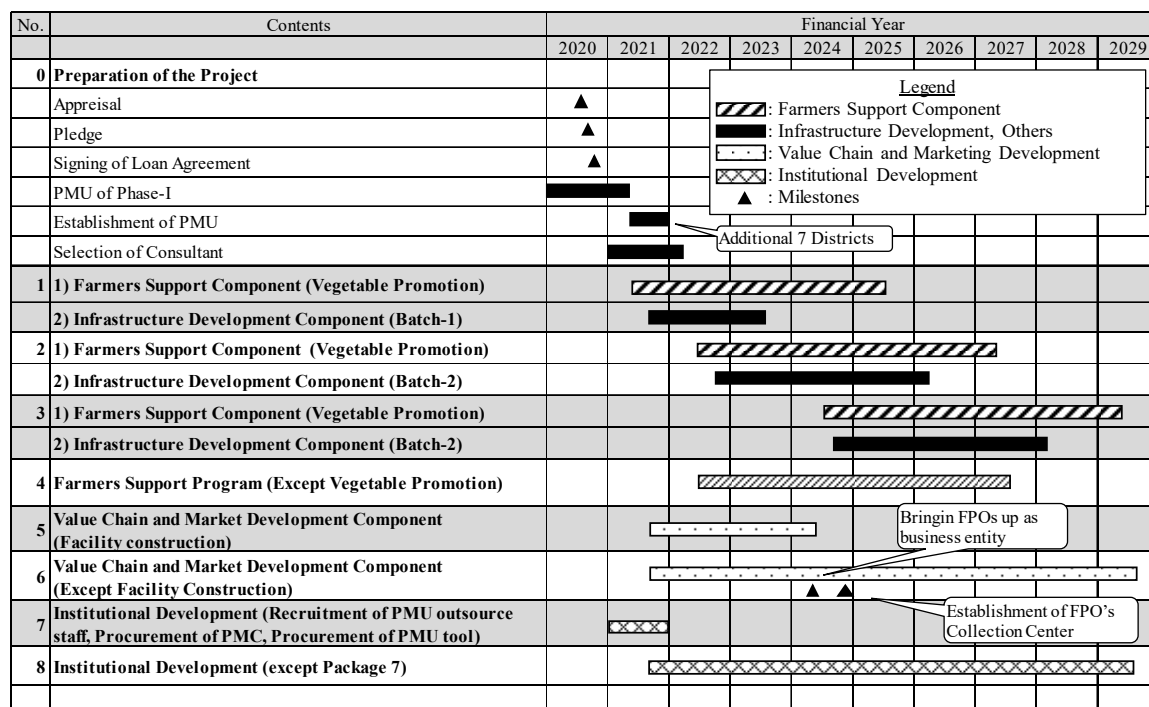
59. Implementation Plan of Institutional Development Component

The institutional development component includes strengthening PMU implementation capacity, strengthening DoA extension capacity and baseline surveys and project evaluations. The Himachal Pradesh Agriculture Development Society will launch the PMU, and the PMC, in collaboration with SAU, will provide capacity development training to PMU. The PMU will carry out the planning and monitoring of the overall implementation plan, supply chain plan market development plan and crop diversification plan, and the PMC will assist them. In addition, a local information technology (IT) company will build a project management system using information and communications technology (ICT) and management information system (MIS) under the advice of PMC. In addition, the materials and equipment required for the establishment of the project management system will be procured from local suppliers. Regarding the construction of State Agricultural Management and Extension Training Institute (SAMETI's) training facility, SPMU will provide SAMETI with the necessary funds for the construction cost after the SPMU approves the DPR created by SAMETI. SAMETI contracts with a local contractor to carry out the necessary construction. The practice of Information, Education and Communication aimed at collaboration with PMU, DoA and related stakeholder will be carried out in collaboration with DPMU and DDA, and PMC will support as appropriate. Training on agricultural technology dissemination and engineering for DoA staff will be conducted by PMC with the cooperation of SAU. PMU and PMC will jointly carry out a trial for building an FPO-based extension system.

Seminars and overseas training will be conducted by PMC. Regarding the strengthening of DDA training facilities, funding will be provided to DoA based on the DPR approved by SPMU, and DoA will conclude a contract with a local contractor and construct it.

Baseline surveys and project evaluations will be conducted by PMU and supported by PMC.

60. Implementation period is nine years starting at 2021.



Source: JICA Survey Team

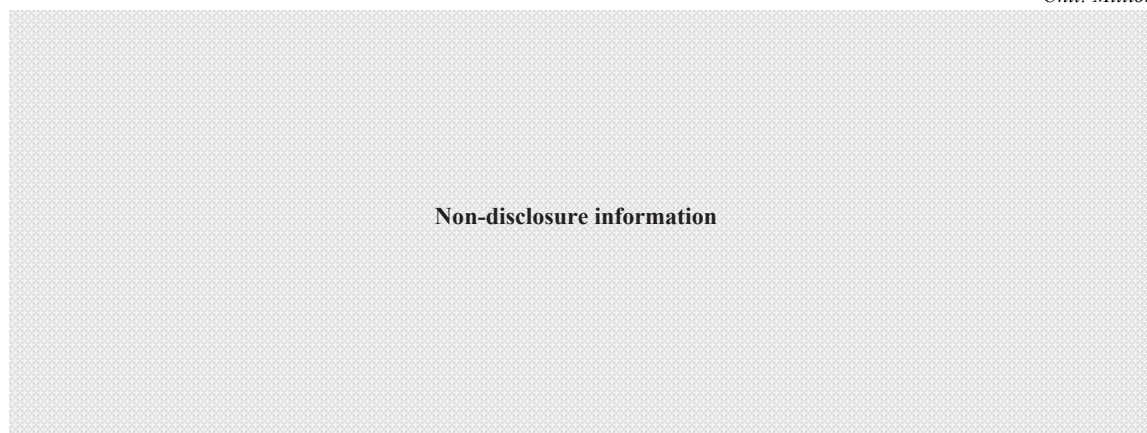
Overall Implementation Schedule

Chapter 8: Project Cost



Summary of Project Cost

Unit: Million



Non-disclosure information

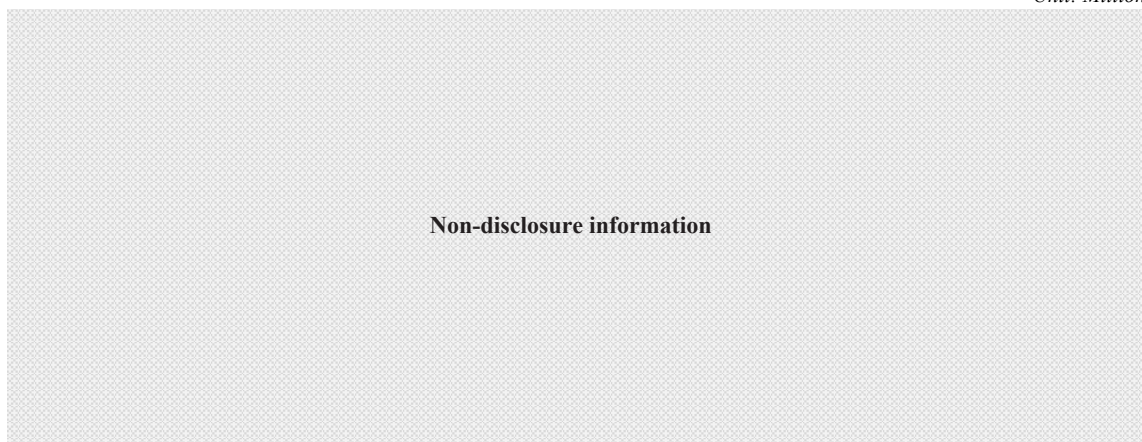
Source: JICA Survey Team

62. The infrastructure development cost includes (1) Minor Irrigation, (2) Micro Irrigation Systems, (3) Catchment Area Treatment, (4) Solar Pumping, (5) Access Farm Roads, (6) Solar/ electric fencing, (7) Crop Diversification through Convergence in created irrigation potential of irrigation

Schemes of IPH/DOA, (8) Miscellaneous of above works (Infrastructure development support), and (9) Survey, Investigating, Designating & Estimation as follows.

Summary of Infrastructure Development Component Cost

Unit: Million

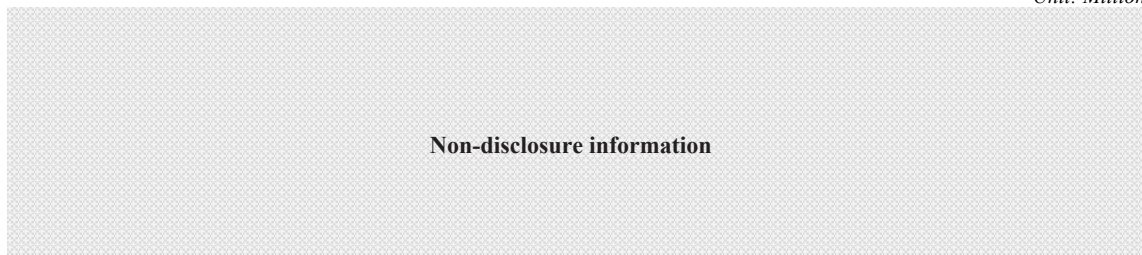


Source: JICA Survey Team

63. The farmers' support component includes: (1) Formation and Strengthening KVA, (2) Vegetable Promotion, (3) Other activities including R&D support, Assistance for soil testing kits, and Infrastructure development at SAU for vegetable seed production, (4) Innovative activities, (5) Livelihood support activities for on /off farm activities and service sector activities and (6) Nutrition Improvement Program as follows:

Summary of Farmers' Support Component Cost

Unit: Million



Source: JICA Survey Team

64. The Value Chain and Market Development Component includes (1) Bringing FPOs up as a business entity, (2) Establishment of FPO's Collection Center, (3) Matching FPOs with agribusiness operators and Facilitation of pilot business trials, (4) Modernizing facilities and equipment in Mandis, and (5) Empowerment of CAs as follows.

Summary of Value Chain, Market Development Component Cost

Unit: Million



Source: JICA Survey Team

65. The institutional development Component consists of (1) Strengthening of DOA, (2) Strengthening of Extension Service Function, (3) Baseline Survey and Impact Assessment as follow.

Summary of Institutional Development Component Cost

Unit: Million

Non-disclosure information

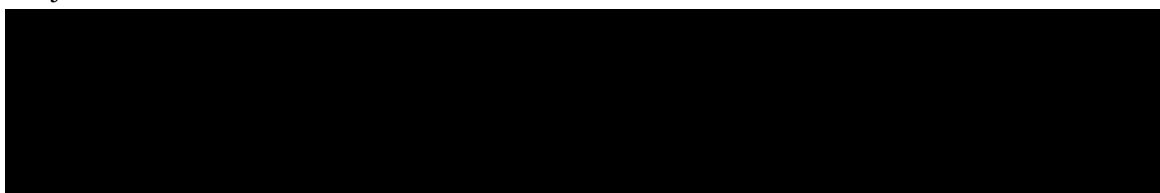
Source: JICA Survey Team

Chapter 9: Project Evaluation

66. Financial Capacity of the State Government

As a result of the comparison assessment of dominant percentages of several projects' cost in the annual governmental expenditures, the cost of the Project could be acceptable amount for implementation agency of the State of Himachal Pradesh.

67. Project Benefits and Economic Evaluation



68. Operation and Effect Indicators

In order to monitor and evaluate the project effects, operation and effect indicators have been set up. Operation indicators are 1) collection rate of water service fee in 306 sub-projects, 2) number of farmers cultivating vegetables in 306 sub-projects, 3) number of FPOs starting the business with private company, 4) number of DoA extension staff using materials provided by PMU in the whole state.

Effect indicators are 1) yield of selected crop in 306 sub-projects, 2) cultivation area of vegetables in CCA in 306 sub-projects, 3) rate of shipping price of FPO to farm gate price of vegetables in 306 sub-projects.

69. Risk Management

Risks of the Project are identified and assessed from the points of 1) stakeholder risk, 2) executing agency risk, and 3) project risk based on JICA's Risk Management Framework, and each treatment for risks to be conducted by the Project are proposed.

70. Adaptation Measures for Climate Change

In accordance with the JICA Climate Finance Impact Tool for Adaptation, adaptation measures for climate change and the support by the Project are considered based on risk assessment of climate hazards in Himachal Pradesh.

Chapter 10: Environmental and Social Considerations

71. Apart from the national level laws/policies, Himachal Pradesh State has formulated its own laws, rules, regulations, notifications, guidelines, policies and standards with respect to different aspects of ESC that ensure consistency with key relevant national laws and regulations. In addition, as the subprojects will involve the contractors to work in designated areas for infrastructure development of micro-irrigation schemes, labour laws that might be pertinent under the proposed Project are applied.

72. As per draft EIA Notification 2020, the list of projects related to agriculture area and irrigation requiring prior-Environmental Clearance is listed. The list describes the category of the projects and the threshold limits specified for areas related to agriculture and irrigation sector. As part of the draft EIA 2020, the irrigation projects with >2,000 CCA are required prior-environmental

clearance. As the proposed activities under the project are all part of minor irrigation schemes with < 100 CCA, thus prior environmental clearance is not required.

73. Population and Distribution: STs accounted for 5.71% of the total population in the state and the GoI has notified eight tribal groups of Himachal Pradesh State as STs (The Constitution (Scheduled Tribes) Order 1950 (C.O.22), dated 6-9-1950). The STs of Himachal Pradesh State live in the most inaccessible places, mountains and jungles, in the districts of Chamba, Kinnaur, Kangra, Mandi, Bilaspur, Mahasu, Sirmaur and Lahaul-Spiti. They are the minority in some districts, such as Mandi, Sirmaur and Bilaspur, whereas they are the majority in the districts of Chamba, Kinnaur and Lahaul-Spiti. Cultural characteristics: The tribal society is organised on the basis of kinship and they accept inheritance and authority through the male lineage. The rites of passage comprise birth, puberty, marriage, and death, and these stages of life play a very important role in tribal society for which initiation and training are provided carefully. The major religious population of Himachal Pradesh State is Hindu, which constitutes more than 95% of the total. Muslim religion occupies the second position with nearly 1.7% of the total. Muslims have a little concentration in Sirmur, Chamba and Kangra. Among the tribal communities, Hinduism and Buddhism are followed. A minuscule proportion follows Islam.
74. In Himachal Pradesh State, there are 26 wildlife sanctuaries covering a total area of 5,964.97 km², five national parks covering 2,407.28 km² and three conservation reserves covering 19.17 km². Under the proposed Project, however, subproject indicative exclusion criteria are set up as depicted in the Environmental and Social Assessment Framework (ESAF). Among the screening criteria for subproject, the criteria for identifying proposed areas within 5 km radius distance from the national park, wildlife sanctuary and ecologically important habitats are screened out from the list, thus, there is no likelihood/possibility of any resettlement and rehabilitation of these indigenous population required due to project activities.
75. The Himachal Pradesh Agriculture Development Society (HPADS) will be the implementing agency (IA) for this Project and will execute the proposed activities. All activities of the Project shall be implemented in accordance with the legislation system at the national and state level, which provides clear guidelines and procedures for environmental and social safeguard. However, HPADS does not have dedicated units or personnel for implementation of environmental procedures such as screening, categorisation and environmental review as per prevalent laws and regulations. In this regard, the Environmental Social Assessment Framework (ESAF) shall be the principal document, which provide the basis for detailed procedures for screening, categorisation and environmental review of the Project and its activities. For the implementation of ESAF, the IA will assign Nodal Officers for environmental and social safeguards.
76. SPMU shall mobilise Nodal Officers at the preparatory phase of the Project and the experts shall support SPMU and DPMU for the finalisation of ESAF document, which fully addresses all issues arising under the Project and its activities/subprojects. Mitigation measures will be built into project component design and implementation. Under the Project, as mentioned above, the overall coordination and support for ESAF will be provided through SPMU headed by the Director vested with additional responsibility to ensure implementation and monitoring and compliance of ESAF during the project implementation. Under the supervision of SPMU, his/her deputies will hold position as Environmental and Social Safeguard Managers for their activities in each designated work field. In order to examine the proposed institutional arrangement and enhance its system, the draft Environmental Social Management System (ESMS) Checklist for the Project has been prepared.
77. Unlike a typical infrastructure project, this Project is anticipated to have multi-sectoral interventions and activities, being implemented at several sites with many subprojects and many of these subprojects are yet to be defined in detail (site location, size/scope of the activity). In these circumstances, it would be inappropriate at this stage of project preparation to assess the environmental and social impacts and propose detailed management and mitigation measures. However, the JICA Survey Team assessed the broad types of activities proposed and outlined the procedures to manage and mitigate potential risks associated with the activity during the project

implementation. Accordingly, ESAF which provides guidance on the appropriate management and mitigation measures against environmental and social risks was prepared as the main safeguard instrument considering the existing environmental and social management systems in India and Himachal Pradesh State as well as the JICA requirements.

78. JICA has classified the project as Category B. The JICA Environmental and Social Guidelines requires Initial Environmental Examination (IEE) for Category B projects. This project aims to be funded by JICA; it is deemed that IEE is basically necessary.
79. In the meantime, as final location and contents of the subprojects would not be determined before the JICA loan agreement, IEE cannot be conducted during feasibility study (F/S) stage. The F/S will review the environmental and social impact assessment framework formulated in HPCDP II and collect information on environmental and social considerations so that necessary environmental and social considerations will be taken just after specifying the subprojects. If a subproject is regarded as Category B, the project is required to conduct environmental and social considerations study.
80. The ToR of the JICA Survey requires to prepare the criteria for selection of subproject from the viewpoint of environmental and social considerations and establishment of environmental and social impact assessment framework. Classification of the category for each subproject and necessary environmental and social consideration measures are determined/prepared through two steps, i.e., the F/S period and detailed design period, in accordance with the ToR. Hence, it is difficult to determine the necessity of environmental and social study during the F/S stage, and the decision will be made after the selection of the subprojects using the framework.
81. DPR mentions that EIA and IEE are not necessary with preliminary screening even though present situations at sites and original designs are not clear. After the selection of the subprojects with original designs, screening at each subproject must be implemented; therefore, the F/S survey should collect environmental and social information and predict possibly necessary procedures to make provision for smooth implementation of the project.

Chapter 11: Recommendations

82. Early Implementation of the Project

According to the sample survey and series of discussion with the Himachal Pradesh government, the strong motivation and needs for implementation of the Project are confirmed. Although the project activities of HPCDP I will be winded up in March 2021, the Himachal Pradesh state government will maintain the Project Management Unit (PMU) with state fund in order to use the developed human resources fully for HPCDP II. These budgetary measures are an expression of the Himachal Pradesh government's desire to carry out the project and achieve good results.

In addition, the economic internal rate of return (EIRR) drops by 1% when the implementation is delayed by five years while the current economic evaluation results show an EIRR of 14.4%. From these points of view, early conclusion of official development assistance (ODA) loan agreement and implementation of the Project at an early stage are desirable.

83. Flexible Project Operation Refracting Actual Needs and Trends

The necessary project components and implementation plan including implementation organisation, necessary costs and so on to achieve the project goals were identified during the preparatory survey. However, these components are, in practical, rearranged and implemented in the newly formulated three-layer plan namely: overall implementation plan, supply chain and market development plan and crop diversification plan in subprojects as shown in Chapter 6. It is hoped that these plans will be flexibly formulated, reflecting the needs of farmers and market trends.

84. Support PMU with Collaboration of Technical Cooperation Project

As the new agricultural ordinances come into force, Himachal Pradesh, which is dominated by smallholders, will have a risk for inefficient trade under liberalisation of the agriculture marketing. The additional costs due to inefficient distribution are burdened by small-scale producers who do

not have negotiating power and farmers may not be able to enjoy the appropriate benefits of crop diversification. In addition, individual trade with small-scale farmers may be unattractive to distributors or collectors, which narrows the options for farmers to sell their farm produce. It is therefore that organisation and strengthening of Farmer Producer Organizations (FPOs) tried in HPCDP I will be continued in HPCDP II and nearly ten FPOs will be established in the Project. In addition, from the perspective of sustaining the results after the project completion, there is a need to improve the extension system using the private sector, advanced farmers and FPO. Since the Department of Agriculture (DoA) does not have accumulated sufficient knowledge on the establishment and capacity building of these FPOs and establishment of new extension system, DoA plans to procure a knowledgeable consultant.

However, according to the current implementation process, the procurement of consultants is expected to take one year (until April 2022) after the conclusion of a loan agreement, although initial input with sensitisation is crucial. In order to fill the initial time gap, the scope of the Japan International Cooperation Agency (JICA) Technical Cooperation Project currently being implemented will be amended and the implementation period should be extended by at least one year to support the PMU.

85. Collaboration with Other Relevant Departments and Projects

Agroecology zones 2, 3 and 4 with an altitude of 1,500 m or higher occupy 60% of the total in the target area of this project. Since the slopes of zones 2, 3 and 4 are steeper than those of Zone 1, some farmers are cultivating fruit trees. Currently, no fruit trees are cultivated in the irrigation command area; however, farmers may choose fruit trees as strategic crops after crop diversification is progressed. At present, fruit trees are under the jurisdiction of the Department of Horticulture (DoH) and DoH operates some central sponsored schemes and donor support projects to support fruit farmers. When farmers choose fruit trees as crops for crop diversification, it is necessary for PMUs to properly bridge with DoH.

At the same time, support for Himachal Pradesh State Agriculture Marketing Board (HPSAMB) is also being provided by DoH with the funds of the central and state government and donors' fund. Although the commodities handled by each department are different, both departments could get benefit through enhancement of market functions such as establishment of market information provision system.

Regarding livelihood improvement activities, activities such as livestock farming, inland fishery and vocational training are planned. These activities are under the jurisdiction of the Department of Animal Health, Department of Fisheries and the Department of Commerce and Industry. In order to carry out these activities effectively, it is essential to collaborate with these organisations that have knowledge.

Currently, in HP, as shown in Chapter 2 and as shown in DPR, a wide variety of projects are implemented with central government, state government and donor agencies sponsorship. in the field of agricultural development and poverty reduction. Most of them are carried out for aiming to improve farmers' incomes through improving agricultural productivity and profitability which is the same objective of the Project. From the perspective of project efficiency, impact, and sustainability, it is important to formulate a project implementation plan in consideration of cooperation between these projects at the project implementation and post project stage. Considering cooperation and sharing the tasks with other projects, the DPR should be refined toward DFR to formulate an efficient and sustainable project frame.

86. Strengthening of Linkage between DoA and PMU for Project Suitability

Since this project will be implemented in society mode, it is important to transfer the results from Society to DoA during and after the project. Strengthening of extension function, which is one of the Institutional Development Components, is one of the activities aimed at the smooth transfer of the project results to DoA staff. Under such circumstances, it is important to carry out regular information exchange and knowledge sharing between DoA and PMU along with strengthening information and communications technology (ICT).

Also, in HPCDP I, it was planned to establish a new department for marketing activities and Water Users Association (KVA) support, and to revise the scope of work of extension workers: however, in reality, it was not implemented. In HPCDP II, it is necessary, at least, to clarify the person in-charge within the DOA of FPO and WUA before starting the project, and their duties and responsibilities should be officially notified in gazette. Meanwhile, duties and responsibilities on nutrient improvement are also included in job profile of field extension officers in 12 Districts.

It is intimated that strengthening of extension activities should be embarked in extension system, which is established in 12 DDAs beyond linkage between DoA and HPCDP. Namely, capacity building of extension officers in 12 DDAs should be conducted through training programmes, and field activities with extension officers of PMU. Further it is expected that extension service function in 12 DDAs should be strengthened, applying activities of Institutional Development Component in HPCDP-II. It is also suggested that practical function, system, skills, and outputs, which are obtained from HPCDP, should be utilized in DDAs without having to wait for the completion to find out all outputs of HPCDP-II.

87. Achievement of Project Target through Active Utilisation of JICA SHEP Approach and Nutrition Improvement Initiative

As mentioned in Chapter 6, JICA is implementing Smallholder Horticulture Empowerment & Promotion (SHEP) all over the world including the South Asian region, and this method is being recognised as one of the best agricultural development methods in the world. SHEP started in Kenya as the first target country and has already spread to 26 countries in Africa and in recent years, it has been actively working to spread it to the South Asian region such as Pakistan, Bangladesh, Nepal and Sri Lanka. At the discussions between JICA and DoA held in November 2020, Dr. Jiro Aikawa, JICA Senior Advisor, explained the contents of SHEP and DoA gave positive opinions for future utilisation of the method in the Project. Also, nutrition improvement is one of the focus of JICA especially in the South Asian region.

A total of eight overseas trainings are planned for the project and the JICA Survey Team proposes to utilise these trainings to show advanced cases of these initiatives in Japan or other countries at an early stage and incorporate those concepts into the Project.

88. Collect Necessary Data in the Initial Stage of the Project

In this survey, under the influence of the COVID-19 pandemic and due to underdeveloped information service system of concerned agencies, some data related to supply and demand of agricultural produce in and out of the state, domestic and foreign investment in agriculture field and food processing industry were not collected. Since these information are important for formulating the Supply Chain and Market Development Plan created in each collection centre during project implementation, it is necessary for DOA to collect those information in the initial stage of the Project in collaboration with HPSAMB. It is also recommended that DOA and other agencies concerned to value chain and market development of agricultural produce implement a sophisticated information collection and analysis system into their routine works to cope themselves with ongoing dynamic structural change of agricultural market.

89. Update of Master Plan

With JICA assistance, DoA compiled the development survey of "Himachal Pradesh Crop Diversification Comprehensive Development Survey" in 2009, and the "HP Crop Diversification Program" was formulated as one of the HP Agricultural Sector Master Plans. The master plan assessed (1) agricultural policies and organizational systems of the central and state governments, (2) natural conditions / economic and social conditions, (3) current status of agricultural production, agricultural product supply / demand, distribution system, etc., and specified crop diversification plan based on these assessments. The crop diversification plan includes basic strategies, goals, and action plans for further agriculture development. The target year for the master plan is 2022/23, and 10 years have passed since the plan was formulated, and the situation is expected to change from the time the plan was formulated. Therefore, DoA should update the master plan

based on analysis of the current policies, situation and issues and the basic strategy, goals, and action plans should be modified.

90. Collaboration between Agriculture Extension and Anganwadi Officers

As one of the Farmers' Support Components, the project aims to promote the consumption of nutritious vegetables and to disseminate the cultivation technology of those vegetables by promoting the School Garden and Kitchen Garden. These activities are planned to be carried out through agriculture extension officers, but activities in collaboration with Anganwadi officers under Department of Women and Child Development are desired. By collaborating, agriculture extension officers who have cultivation techniques can acquire knowledge about nutrition improvement, and Anganwadi officers can acquire knowledge about cultivation. As a result, cultivation and nutrition are integrated, and the quality of administrative services to farmers is improved.

At the preparatory survey stage, the necessity of these collaborations can be shared among the stakeholders, but discussions on cooperation and implementation systems have not progressed. It is recommended that the cooperation mechanism under the project between the two parties will be discussed before the start of the project.

The Preparatory Survey
on
Himachal Pradesh Crop Diversification Promotion Project Phase-II (HPCDP II)
in
Republic of India

Final Report

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Abbreviations

ABPF	Agri-Business Promotion Facility
ADB	Asian Development Bank
ADO	Agriculture Development Officer
AEO	Agriculture Extension Officer
AERC	Agro-Economic Research Centre
AEZ	Agro-Ecological Zones
AIBF	Accelerated Irrigation Benefit Programme
AIBP	Accelerating completion of ongoing major and medium irrigation project
AL	Automatic Level
APMC	Agricultural Produce Marketing Committees
ATMA	Agriculture Technology Management Agency
BASP	Backward Area Sub Plan
B/C	Benefit and Cost
BPMU	Block level Project Management Unit
CA	Commission Agent
CAD	Computer-aided design
CBO	Community-Based Organisation
CBIA	Community-based Impact Assessment
CCA	Cultivable Command Area
CCSAMMN	Climate Change and Sustainable Agriculture: Monitoring, Modelling and Networking
CDB	Coconut Development Board
CDP	Crop Diversification Project
CFQC&TI	Central Fertiliser Quality Control & Training Institute
CIH	Central Institute for Horticulture
COE	Center of excellence
C/P	Counterpart
CPCB	Central Pollution Control Board
CPRI	Central Potato Research Institute
CR	Choe Reclamation
CSIR	Council of Scientific and Industrial Research
CSKHPKV	Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya
DDA	Deputy of Direct Agriculture
DFR	Draft Final Report
DGPS	Differential global positioning system
DIP	District Irrigation Plan
DoA	Department of Agriculture
DoF	Department of Forest
DoH	Department of Horticulture
DPMU	District level Project Management Unit
DPR	Detailed Project Report
EAP	Externally Aided Project
EC	Environmental Clearance
EIA	Environmental Impact Assessment
EIRR	Economic internal rate of return
EMI	Economic and Marketing Information
eNAM	E-National Agriculture market
EO	Extension Officer
EP	Environmental Permission
ESAF	Environmental and Social Impact Assessment Framework
ESC	Environmental and Social Consideration
ESMS	Environmental Social Management System
FAC	Farmer Advisory Committee
FIG	Farmer Interest Group
FIRR	Financial Internal Rate of Return
FIS	Flow Irrigation Scheme

FPO	Farmers' Producer Organisation
FRE	First Revised Estimates
F/S	Feasibility study
FTC	Farmers Training Centre
FYPs	Five-Year Plans
GDP	Gross Domestic Product
GIS	Geological Information System
GOI	Government of India
GoHP	Government of Himachal Pradesh
GPS	Global Positioning System
GSDP	Gross state domestic product
GST	Goods and Services Tax
HMNEH	Horticulture Mission for North East and Himalayan States
HP	Himachal Pradesh
HPADS	Himachal Pradesh Agriculture Development Society
HPCDP I	Himachal Pradesh Crop Diversification Project Phase-I
HPCDP II	Preparatory Survey on Himachal Pradesh Crop Diversification Promotion Project Phase-II
HPCDW	Himachal Pradesh Corporation for Development of Women
HPDE	High-Density Polyethylene
HPHDP	Himachal Pradesh Horticulture Development Project
HPKCC	Himachal Pradesh Knowledge Cell on Climate Change
HP PWD	Himachal Pradesh Public Works Department
HPSAMB	Himachal Pradesh State Agriculture Marketing Board
HP SEBL	Himachal Pradesh State Electricity Board Limited
HP SHIVA	Himachal Pradesh Subtropical Horticulture, Irrigation and Value Addition Project
HRD	Human Resource Development
HTM	Horticulture Technology Mission
HYV	High Yielding Varieties
IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
ICT	Information and Communication Technology
IEC	Information, Education and Communication
IEE	Initial Environmental Examination
IFAD	International Fund of Agricultural Development
IFPRI	International Food Policy Research Institute
IHBT	Institute of Himalayan Bioresource Technology
INM	Integrated Nutrient Management
IoT	Improvement of communication
IPHD	Irrigation & Public Health Department
IPM	Integrated Pest Management
IRR	Internal Rate of Return
IWMP	Integrated Watershed Management Programme
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
KVA	Krishak Vikas Association
KVK	Krishi Vigyan Kendras
LCB	Local Competitive Bidding
LIS	Lift Irrigation Scheme
LPS	Lahaul Potato Society
MADA	Modified Area Development Approach
MC	Market Development Component
MFP	Multi Function Printer
MFPI	Ministry of Food Processing Industries
MIDH	Mission for Integrated Development of Horticulture
MINARS	Monitoring of National Aquatic Resources
MIS	Micro Irrigation System

MMGHR	Mukhya Mantri Green House Revolution Scheme
MMKSY	Mukhya Mantri Khet Sansarkshan Yojna
MMNPY	Mukhya Mantri Nutan Polyhouse Yojna
MNAIS	Modified National Agricultural Insurance Scheme
MNRE	Ministry of New and Renewable Energy
MoEF&CC	Ministry of Environment, Forest and Climate Change
MOFPI	Ministry of Food Processing Industries
MoU	Minutes of Understanding
MSME	Micro, Small and Medium Enterprises
NABARD	National Bank for Agriculture and Rural Development
NABCONS	NABARD Consultancy Services
NAGS	National Active Germplasm Site
NAIS	National Agricultural Insurance Scheme
NAMP	National Ambient Air Quality Monitoring Programme
NAPCC	National Action Plan on Climate Change
NATP	National Agricultural Technology Project
NBM	National bamboo Mission
NDRF	National Disaster Response Fund
NFSM	National Food Security Mission
NGO	Non Governmental Organization
NHB	National Horticulture Board
NHM	National Horticulture Mission
NIDDCP	National Iodine Deficiency Disorder Control Program
NIPI	National Iron Plus Initiative
NITI	National Institute of Transforming India
NMAET	National Mission on Agriculture Extension and Technology
NMFP	National Mission on Food Processing
NMSA	National Mission on Sustainable Agriculture
NOC	No Objection Certificate
NRCM	National Research Center for Mushroom
NREGA	National Rural Employment Guarantee Act
NREGS	National Rural Employment Guarantee Scheme
ODA	Official Development Assistance
ODOP	One District One Product
OFWM	On Farm Water Management
O&M	Operation and Maintenance
PACS	Primary Agricultural Cooperative Societies
PDCA	Plan, Do, Check and Act
PGS	Participatory Guarantee System
PIM	Product Information Management
PKVY	Prampragat Krishi Vikas Yojna
PMC	Project Management Consultant
PMFBY	Pradhan Mantri Fasal Bima Yojna
PM-KISAN	Pradhan Mantri Kisan Samman Nidhi Yojna
PMKSY	Pradhan Manti Krishi Sinchayee Yojna
PM-KUSUM	Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan Scheme
PMU	Project Management Unit
PPC	Primary Processing Centre
PPT	Microsoft PowerPoint
P/Q	Pre Qualification
PRA	Participatory Rural Appraisal
PV	Photovoltaics
QC	Quality Control
RAD	Rainfed Area Development
RIDF	Rural Infrastructure Development Fund
RKBY	Rashtriya Krishi Bima Yojana
RKVY	Rashtriya Krishi Vikas Yojana

RKYP	Rajya Krishi Yantrikaran Programme
RSPM	Respirable Suspended Particulate Matter
R&D	Research and Development
R&R	Rehabilitation and Resettlement
SAME	Sub Mission on Agricultural Extension
SAMETI	State Agricultural Management and Extension Training Institute
SAU	State Agriculture University
SC	Scheduled Castes
SCA	Special Central Assistance
SCF	Standard Conversion Factor
SCTC	Shitake Cultivation Training Center
SCSP	Scheduled Castes Sub Plan
SDG	Sustainable Development Goals
SDSCO	Sub-divisional Soil Conservation Officer
SEIAA	State Environmental Impact Assessment Authority
SFAC	Small Farmers Business Consortium
SHEP	Smallholder Horticulture Empowerment and Promotion
SHG	Self Help Group
SHM	Soil Health Management
SIA	Social Impact Assessment
SLEC	State Level Empowered Committee
SMAF	Sub Mission on Agroforestry
SMAM	Sub Mission on Agricultural Mechanization
SMFP	State Mission on Food Processing
SMPP	Sub Mission on Plant Protection and Plant Quarantine
SMS	Subject Matter Specialist
SMSP	Sub Mission on Seed and Planting Material
SNS	Social Networking Service
SOP	Standard Operation Procedure
SPCB	State Pollution Control Boards
SPMU	State level Project management Unit
SPNF	State funds
SRE	Second Revised Estimates
SSY	Sinchayee Yojna
ST	Scheduled Tribes
STW	Shallow Tube Well
SUA	State Agriculture University
SWR	Shadow Wage Rate
TCP	JICA technical cooperation project
ToR	Terms of Reference
TOT	Training of Trainers
TS	Total Station
TSP	Tribal Sub Plan
UN	United Nations
UPS	Uninterruptible Power Supply
UT	Union territorie
UTEIAA	Union Territory Level Environmental Impact Assessment Authority
WBCIS	Weather-based Crop Insurance Scheme
WIFS	Weekly Iron Folic Acid Supplementation
WUA	Water Users Association
YSP UHF	Dr. Y. S. Parmar University of Horticulture and Forestry
ZBNF	Under Zero Budget Natural Farming

Measurement Units

Area

cm² = Square-centimetre(s)
m² = Square-metre(s)
km² = Square-kilometre(s) (1,000,000 m²)
ha = Hectare(s) (10,000 m²)
acre = Acre(s) (4,046.8 m² or 0.40468 ha.)

Length

mm = Millimetre(s)
cm = Centimetre(s)
m = Metre(s)
km = Kilometre(s) (1,000 m)

Currency

US\$ = United State Dollars
US\$1.0 = Yen 103.896 = INR 72.745
(as of Feb 2021)
Yen = Japanese Yen
INR = Indian Rupee

Volume

cm³ = Cubic-centimetre(s)
m³ = Cubic-metre(s)
L = Litre(s) (1,000 cm³)
MCM = Million Cubic Metre (s)

Weight

g = Gram(s)
kg = Kilogram(s) (1,000 gr.)
tonne = Metric Tonne(s) (1,000 kg)
t = Metric Tonne(s) (in Table)

Time

sec = Second(s)
min = Minute(s) (60 sec.)
hr = Hour(s) (60 min.)

Indian Numbering

Lakh(s) = Hundred Thousand (100,000)
Crore(s) = Ten Million (10,000,000) or
100 lakhs

Chapter 1 Introduction

1.1 Authority

This final report is prepared in accordance with the terms of reference (TOR) of the contract agreement between the Japan International Cooperation Agency (JICA) and Nippon Koei Co., Ltd. signed on 8 July 2020 for the Preparatory Survey on Himachal Pradesh Crop Diversification Promotion Project Phase-II (HPCDP II).

This report presents the survey outputs of all the work for the period of July to December 2020.

1.2 Background of the Survey

The agriculture sector is a crucial industry in securing employment and improving livelihood in India, where currently 890 million of the people live in rural settings. Himachal Pradesh (HP) is a hill state located at the foot of the Western Himalayas with the total land area of 56,000 km² and population of 6.8 million (Population Census 2011). Due to its topographic feature of the hilly terrain, irrigated land is limited to 15% of the total cultivable area. About 60% of the working population of the state is engaged in agriculture, of which 80% are small farmers with less than two hectares of farming land. Therefore, majority of the farmers remain engaged in self-subsistence crop cultivation. Despite its high potential of value addition adopting cash crops such as vegetables suitable in hilly and highland areas, the increase of farm income in the rural areas through shifting from self-subsistence crop cultivation to diversified agriculture has been limited due to shortage of irrigation facilities and insufficient marketing facilities.

The Government of HP, with the intention of improving such situation, developed a crop diversification programme through “the Study on Diversified Agriculture for Enhanced Farm Income in the State of Himachal Pradesh” in 2007, where seven high-value vegetables were selected as strategic crop diversification. Under the programme, the “Himachal Pradesh Crop Diversification Promotion Project” was launched in 2011 as an official development assistance (ODA) loan project, targeting 210 sub-project sites in five districts of Bilaspur, Hamirpur, Kangra, Mandi and Una. The state government has recognized the project as a model that realizes the increase of farm income through the transition from self-subsistence crop cultivation to diversified agriculture in conjunction with improvement of irrigation facilities.

The annual volume of trade of the high-value vegetables in the major market of India increased by 1.8 times between 2004 and 2014. A higher growth in demand for the vegetables is expected considering the economic development and population growth in India. The total demand for the high-value vegetables in HP and Delhi in year 2022 to 2023 is expected to be 7.4 million tons per year, while the possible supply of the vegetables from Himachal Pradesh is projected to be 1.33 million tons per year. Consequently, it is important to improve productivity of the vegetable cultivation through diversification by expanding the model of the Crop Diversification Promotion Project. Moreover, the support on the emerging needs of effective agriculture extension service including improvement of irrigation facilities, cultivation skills and agriculture inputs, as well as promotion of marketing, which can be learnt from the ongoing ODA project, will contribute to the improvement of productivity.

In the policy paper of National Institution for Transforming India (NITI) Aayog “Doubling Farmers’ Income (2017)”, the Government of India directs to increase farmers’ income twice of the level of 2015 by 2022 through emphasising more on farmers’ income rather than on production output through the diversification of crops, development of irrigation facilities, improvement of seeds and fertilizers, and rectification of agriculture produce trading prices. Judging from the government policy, it is obvious that the improvement of farmers’ income is one of the most important issues to be undertaken. Accordingly, Phase 2 of the “Himachal Pradesh Crop Diversification Promotion Project” contributes to accomplishing the policy goals and is taken as a crucial project in the agriculture sector of the country as well as in HP.

The HP Department of Agriculture (DoA), the main counterpart (C/P) of the project, has been executing the “Himachal Pradesh Crop Diversification Promotion Project”, which was launched in 2011 based on the result of the “Study on Diversified Agriculture for Enhances Farm Income in the State of Himachal

Pradesh” (2007). A model of crop diversification approach was established through the HPCDPI, which is to be expanded to the whole state in the Project Phase 2. In parallel, DoA has taken charge of the technical cooperation project of “Himachal Pradesh Crop Diversification Promotion Project” (2011-2016) that promoted the capacity development of personnel for crop diversification, and the succeeding project of “Himachal Pradesh Crop Diversification Promotion Project Phase 2” (2016-2022) intending to strengthen the model in the aspects of post-harvesting technology, processing and marketing.

Fundamental data and information including agriculture patterns, economic status, situation of agriculture sector in HP, and capacities of the implementing agency, have been accumulated through the previous study and projects. However, further analysis and explanation are required in addition to the submitted detailed project report (DPR) of the project for smooth execution of the project. Further explanation is needed especially concerning specified lessons and constraints learnt from previous projects, natural status of irrigation sites for newly involved areas, marketing system for crop and vegetables, situation of supply chain, project cost estimate, and implementing structures. This survey is to be implemented to complement the DPR by reviewing the proposed programmes, by analysing the validity, the project impacts, and its measuring method.

1.3 Objective of the Survey

The main objective of the “Himachal Pradesh Crop Diversification Promotion Project Phase II” is to promote crop diversification and value addition of the agriculture produce in the State of HP through the development of infrastructure facilities such as irrigation facilities and farm access roads, along with the promotion of marketing and strengthening of agriculture extension services, to improve the livelihood of the farmers in the area.

The survey intends to compile the necessary information and recommendation for execution of the abovementioned project as an ODA loan project funded by JICA based on the lessons learnt from the Project Phase I. Validity and rational of the project shall be confirmed through the review and analysis of the DPR especially on the proposed programmes, implementing schedule, organisation, procurement, construction management, total project cost, environment and social consideration issues, economic and financial analysis, and output indicator.

1.4 Survey Area

The target survey area was the whole 12 districts of the State of Himachal Pradesh (Hamirpur, Mandi, Kangra, Una, Bilaspur, Shimla, Sirmour, Kinnaur, Kullu, Lahul and Spiti, Chamba, and Solan). This is illustrated in the survey map on the first page of this report.

1.5 Scope of the Survey

The scope of survey includes the execution of the survey works indicated below considering the points of concern listed in order to achieve the abovementioned survey objective.

The survey works include the collection and analysis of existing data, survey and analysis of overview of agriculture sector in India and HP, ongoing and related project, and budget and financial status of the government, review of prepared DPR, refining of proposed project components, formulation of project implementation plan, and conduction of training in Japan.

Points of concern for the execution of the survey were as listed below.

- i) Applying the “model projects” established in HPCDP I
- ii) Preparation of the project implementation plan as basis of judgement for project execution
- iii) Utilization of the results and lessons from the previous related projects
- iv) Partial update of the master plan of the “Himachal Pradesh Crop Diversification Programme”
- v) Incorporation of relevant Japanese resources through training in Japan,
- vi) Integration of Smallholder Horticulture Empowerment and Promotion (SHEP) approach, and nutrition sensitive activities
- vii) Cooperation with other relevant projects
- viii) Analysis of issues on environment and social consideration

1.6 Work Schedule of the Survey

The survey was conducted from July 2020 to March 2021 for a period of nine months. The outline of the work schedule is indicated in Table 1.6.1.

Table 1.6.1 Work Schedule

Work items	Timing	2020						2021		
		7	8	9	10	11	12	1	2	3
1. Preparatory Work										
(1) Collect and analyze existing data		□								
(2) Prepare and discuss Inception report		□								
(3) Prepare materials for discussion with stakeholders		□								
2. 1st Work in Japan										
(1) Explain Inception report to HP stakeholders			□							
(2) Survey on overview of agriculture sector in India and HP			□							
(3) Survey on socio-economic conditions of HP			□							
(4) Analysis of present situation of agriculture production and supply chain			□							
(5) Survey on ongoing and planned related project			□							
(6) Confirmation of state government budget and financial status of executing agency			□							
(7) Review of DPR, confirm sub-project situation			□							
(8) Infrastructure development program with proper O&M				□						
(9) Value chain, market development program				□						
(10) Farmer's support program				□						
(11) Institutional development program				□						
(12) Collaboration with private sector				□						
(13) Gender mainstreaming					□					
(14) Nutrition improvement					□					
(15) Prepare and discuss Interim report					□					
(16) Prepare basic concept of training in Japan					□					
3. 1st Work in India										
(1) Discuss Interim Report						■				
(2) Formulate project implementation plan, basic design, prepare long list of sub-projects						■				
(3) Cost estimate						■				
(4) Project implementation and monitoring setup						■				
(5) Procurement plan						■				
(6) Operation and maintenance plan						■				
(7) Environment and social consideration						■				
(8) Project impact						■				
(9) Impact of climate change and agricultural infrastructure						■				
(10) TOR for consulting service						■				
(11) Risk management						■				
(12) Action plan to commencement of the project						■				
4. 2nd Work in Japan										
Prepare and discuss Draft final Report								□		
5. 2nd Work in India										
Discuss Draft Final Report									■	
6. 3rd Work in Japan										
(1) Prepare Final Report									□	
(2) Update DPR										□
(3) Conduct training in Japan										□
Reports										
Inception Report		▲								
Interim Report					▲					
Draft Final Report								▲		
Final Report										▲

Legend: □ Work in Japan ■ Work in India ▲ Report submission

Note : Work in India was changed to work in Japan and training in Japan planned in 3rd work was cancelled.
Source: JICA Survey Team

Chapter 2 Natural and Socio-Economic Status of the Survey Area

2.1 Area and Demography

2.1.1 General

Himachal Pradesh (HP) is a relatively small state in terms of area and population. The geographical area of the state is 55,673 km² in total, bordering the Jammu and Kashmir State in the north to northwest, Tibet in the east, the Uttarakhand State in the southeast, the Haryana State in south and the Punjab State in the southwest to west. The total population of the state was 6,864,602 in 2011 according to the latest census of India (2011 Census).

HP has 12 districts, namely; Hamirpur, Mandi, Kangra, Una, Bilaspur, Shimla, Sirmaur, Kinnaur, Kullu, Lahul and Spiti, Chamba, and Solan, with the state capital of Shimla.

The section below describes the socioeconomic features of the state with district-wise figures.

2.1.2 Administrative Structure

Under the state administration, the districts are divided into different administrative units for different purposes. The sub-division works as a general administrative unit under the district, while the tehsil is the basic unit of revenue administration that looks after the collection of land revenue, safeguarding of government land, and relief operations for natural calamity. Districts are also divided into development blocks for the purpose of rural development. The administrative units at the sub-divisional level consists of several gram panchayats which is the formalised local self-governance system at the grassroot level. Table 2.1.1 shows the overview of the administrative units of the HP by districts.

Table 2.1.1 Number of Administrative Units by District

District	Sub-Divisions	Tehsil/Sub-Tehsil	Development Blocks	Gram Panchayats	Villages		
					Total	Inhabited	Un-inhabited
Bilaspur	4	7	4	151	1,061	953	108
Chamba	7	13	7	283	1,591	1,110	481
Hamirpur	5	10	6	229	1,725	1,671	54
Kangra	14	34	15	748	3,869	3,617	252
Kinnaur	3	7	3	65	660	241	419
Kullu	4	8	5	204	326	314	12
L&S	3	3	2	41	521	280	241
Mandi	10	24	11	469	3,338	2,850	488
Shimla	6	25	11	363	3,231	2,705	526
Sirmaur	6	13	6	228	976	968	8
Solan	4	12	5	211	2,544	2,383	161
Una	5	12	5	234	848	790	58
H.P.	71	168	80	3,226	20,690	17,882	2,808

Source: Website of each district from <https://himachal.nic.in/en-IN/districts.html>, and Statistical Year Book of HP 2018-19

2.1.3 Demographic Feature

(1) Population

According to the 2011 Census, the total population of the state was 6,864,602, and the projected population for 2019 accounted to 7,542,000. The population density of the whole state is 123 persons per square kilometre, with a range from the highest of 407 in Hamirpur District to the lowest of 2 in Lahaul-Spiti District. The overall decennial growth rate of the population was 12.9% during 2001-2011, whereas the growth rate between 2011 and 2021 was projected at 9.46%. Even though the growth rate

has eased between 2011-2021, the population of HP continues to grow by nearly 10%. There is a remarkable disparity in growth rate by district as shown in Table 2.1.2.

Table 2.1.2 Area, Density and Decennial Growth of Population by District

District	Area in sq. kms.	Total Population				Decennial Growth (2001-2011)	Decennial Growth (2011-2021) (Projected)	Density per sq. km. (2011 Census)
		2001 Census	2011 Census	2017 (Projected)	2019 (Projected)			
Bilaspur	1,167	3,40,885	3,81,956	4,03,000	4,23,000	12.05	7.87	327
Chamba	6,522	4,60,887	5,19,080	5,50,000	5,78,000	12.63	8.51	80
Hamirpur	1,118	4,12,700	4,54,768	4,79,000	5,00,000	10.19	7.61	407
Kangra	5,739	13,39,030	15,10,075	16,10,000	16,91,000	12.77	9.45	263
Kinnaur	6,401	78,334	84,121	85,000	89,000	7.39	1.49	13
Kullu	5,503	3,81,571	4,37,903	4,72,000	4,99,000	14.76	11.12	80
L&S	13,841	33,224	31,564	32,000	32,000	-5.00	1.97	2
Mandi	3,950	9,01,344	9,99,777	10,55,000	11,13,000	10.92	7.89	253
Shimla	5,131	7,22,502	8,14,010	8,68,000	8,72,000	12.67	9.48	159
Sirmaur	2,825	4,58,593	5,29,855	5,70,000	5,79,000	15.54	10.82	188
Solan	1,936	5,00,557	5,80,320	6,25,000	6,22,000	15.93	11.00	300
Una	1,540	4,48,273	5,21,173	5,62,000	5,44,000	16.26	11.19	338
H.P.	55,673	60,77,900	68,64,602	73,19,000	75,42,000	12.94	9.46	123

Source: JICA Survey Team based on the data in HP Statistics Abstract 2018-19 and Statistical Year Book of HP 2018-19

Looking into the population distribution in the rural and urban areas, 90% of the population lives in the rural setting. Even in the state capital of Shimla, only 25% are living in the urban area.

There is no outstanding feature with regard to sex ratio in HP. The number of females per thousand males in the state averages at 972, while the national average is 940. There are more females than males in Hamirpur, Kangra, and Mandi as per seen in Table 2.1.3.

Table 2.1.3 Sex and Rural-Urban Population - 2011 Census

District	Population					Females per '000 Males
	Total	Rural	Urban	Male	Female	
Bilaspur	381,956	356,827	25,129	192,764	189,192	981
Chamba	519,080	482,972	36,108	261,320	257,760	986
Hamirpur	454,768	423,338	31,430	217,070	237,698	1095
Kangra	1,510,075	1423,794	86,281	750,591	759,484	1012
Kinnaur	84,121	84,121	0	46,249	37,872	819
Kullu	437,903	396,512	41,391	225,452	212,451	942
L&S	31,564	31,564	0	16,588	14,976	903
Mandi	999,777	937,140	62,637	498,065	501,712	1007
Shimla	814,010	612,659	201,351	425,039	388,971	915
Sirmaur	529,855	472,690	57,165	276,289	253,566	918
Solan	580,320	478,173	102,147	308,754	271,566	880
Una	521,173	476,260	44,913	263,692	257,481	976
H.P.	6,864,602	6,176,050	688,552	3,481,873	3,382,729	972

Source: Website of each district from <https://himachal.nic.in/en-IN/districts.html>, and Statistical Year Book of HP 2018-19

About one-fourth of the state population is classified as scheduled caste. Scheduled tribes are settled in a certain area. More than 80% of people in the Lahaul-Spiti district are scheduled tribe, nearly 58% in Kinnaur, and more than one-fourth in Chamba, while other districts have less than 6% at most. Kinnaur and Lahaul-Spiti districts, in their entirety, and Pangi and Bharmour (now Tehsil Bharmour and Sub-tehsil Holi) sub-divisions of Chamba District constitute the scheduled areas in the state, which are

situated in the north and north-east of Pradesh forming a continuous belt in the hinterland behind high mountain passes.

Table 2.1.4 Population of Scheduled Castes and Scheduled Tribes – 2011 Census

District	Scheduled Caste				Scheduled Tribe			
	Male	Female	Total	% of Total Population	Male	Female	Total	% of Total Population
Bilaspur	50271	48718	98989	25.92	5485	5208	10693	2.80
Chamba	56154	55536	111690	21.52	67900	67600	135500	26.10
Hamirpur	53727	55529	109256	24.02	1531	1513	3044	0.67
Kangra	159697	159688	319385	21.15	41745	42819	84564	5.60
Kinnaur	7433	7317	14750	17.53	23609	25137	48746	57.95
Kullu	62686	59973	122659	28.01	8493	8329	16822	3.84
L&S	1154	1081	2235	7.08	12748	12959	25707	81.44
Mandi	147250	146489	293739	29.38	6345	6442	12787	1.28
Shimla	110828	104949	215777	26.51	4554	4201	8755	1.08
Sirmaur	83017	77728	160745	30.34	5912	5350	11262	2.13
Solan	85482	79054	164536	28.35	13351	12294	25645	4.42
Una	58601	56890	115491	22.16	4445	4156	8601	1.65
H.P.	876300	852952	1729252	25.19	196118	196008	392126	5.71

Source: Website of each district from <https://himachal.nic.in/en-IN/districts.html>, and Statistical Year Book of HP 2018-19

Concerning religion, Hindus are the dominant population in most of the districts with the exception of Lahaul-Spiti where Buddhists represent 62% of the population. A relatively large population of Buddhists are also settled in Kinnaure even though 77% are still Hindus.

Table 2.1.5 Population Ratio by Religion - 2011 Census

District	Hindus	Sikhs	Muslims	Christians	Buddhist	Jains	Others Religion	Religion not Stated	Total
Bilaspur	97.4%	0.62%	1.83%	0.06%	0.03%	0.00%	0.00%	0.06%	381,956
Chamba	92.4%	0.53%	6.25%	0.30%	0.34%	0.01%	0.00%	0.14%	519,080
Hamirpur	98.8%	0.13%	0.82%	0.05%	0.02%	0.06%	0.00%	0.09%	454,768
Kangra	96.8%	0.59%	1.31%	0.20%	0.96%	0.01%	0.01%	0.15%	1,510,075
Kinnaur	77.0%	0.30%	0.53%	0.58%	21.50%	0.03%	0.05%	0.06%	84,121
Kullu	94.9%	0.32%	0.68%	0.36%	3.51%	0.02%	0.02%	0.17%	437,903
L&S	36.9%	0.11%	0.23%	0.67%	62.01%	0.01%	0.00%	0.06%	31,564
Mandi	98.2%	0.41%	0.95%	0.09%	0.26%	0.00%	0.01%	0.12%	999,777
Shimla	97.2%	0.50%	1.45%	0.25%	0.40%	0.02%	0.02%	0.13%	814,010
Sirmaur	90.0%	2.93%	6.27%	0.11%	0.50%	0.04%	0.02%	0.14%	529,855
Solan	94.5%	2.40%	2.53%	0.25%	0.10%	0.10%	0.02%	0.07%	580,320
Una	92.1%	4.99%	2.74%	0.07%	0.01%	0.01%	0.00%	0.04%	521,173
H.P.	95.2%	1.16%	2.18%	0.18%	1.15%	0.03%	0.01%	0.12%	6,864,602

Source: JICA Survey Team based on Census of India 2011 (Socio-Economic Indicator of HP 2014-15, Department of Economics and Statistics HP)

Analysing the occupation of people in the state, more than 60% of the population is engaged in agriculture. The highest rate of the agriculture workers is observed in Kull District where 73% are cultivators and 5% work as agricultural labourers. Una District has the lowest percentage of cultivators although a remarkable rate of the population is hired agricultural labours. There is a significant disparity between men and women in the distribution of workforce. The number of women engaged in agriculture is almost double of that of men in Bilaspur, Hamirpur, Kangra, Solan, and Una. Meanwhile, the ratio of workforce other than agriculture in male is more than double of that of females. Table 2.1.6 describes the distribution of workforce by sex in each district.

Table 2.1.6 Distribution of Workforce by Sex – 2011 Census

District	No. of Total Workers			Cultivators			Agricultural Labour			Household Industries			Other Workers		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Bilaspur	111,543	94,328	205,871	42%	85%	62%	3%	1%	2%	2%	1%	1%	53%	13%	35%
Chamba	158,791	135,244	294,035	54%	81%	67%	3%	3%	3%	1%	2%	2%	41%	14%	28%
Hamirpur	118,724	123,207	241,931	40%	81%	61%	3%	4%	4%	2%	1%	1%	55%	14%	34%
Kangra	403,756	271,414	675,170	30%	67%	45%	8%	8%	8%	3%	2%	2%	59%	23%	45%
Kinnaur	33,863	22,410	56,273	46%	78%	59%	5%	4%	5%	2%	2%	2%	48%	16%	35%
Kullu	148,829	120,255	269,084	66%	83%	73%	4%	5%	5%	1%	1%	1%	29%	11%	21%
L&S	10,763	8,532	19,295	45%	74%	58%	3%	3%	3%	1%	1%	1%	50%	22%	38%
Mandi	297,464	275,207	572,671	54%	82%	68%	3%	3%	3%	2%	1%	1%	41%	14%	28%
Shimla	258,628	172,298	430,926	49%	72%	58%	6%	6%	6%	2%	2%	2%	44%	20%	34%
Sirmaur	169,399	110,684	280,083	56%	80%	65%	4%	4%	4%	2%	2%	2%	38%	14%	29%
Solan	190,001	108,736	298,737	34%	70%	47%	3%	4%	3%	2%	1%	2%	61%	24%	48%
Una	141,612	73,734	215,346	28%	62%	39%	10%	8%	9%	2%	1%	2%	61%	29%	50%
H.P.	2,043,373	1,516,049	3,559,422	44%	76%	58%	5%	5%	5%	2%	1%	2%	49%	18%	36%

Source: JICA Survey Team based on the data in HP Statistics Abstract 2018-19 Department of Economics and Statistics HP

(2) Income

According to the Economic Survey 2019-20 of HP, the per capita income at current prices in 2018-19 as per first revised estimates (FRE) is valued at INR 183,108, which indicates an increase of 11% from the previous year of 2017-18. According to advanced estimates, the per capita income at current prices during 2019-20 was estimated at INR 195,255 against INR 183,108 in 2018-19 (FRE) showing an increase of 6.6%.

Table 2.1.7 Growth of Per Capita Net State Domestic Product/Per Capita Income of HP

Year	Per Capita Net State Domestic Product/Per Capita income (INR)			
	At Current Prices	Growth Rate (%)	At Constant Price	Growth Rate (%)
2011-12	87,721		87,721	
2012-13	99,730	13.7	92,672	5.6
2013-14	114,095	14.4	98,816	6.6
2014-15	123,299	8.1	105,241	6.5
2015-16	135,512	9.9	112,723	7.1
2016-17	150,290	10.9	122,208	8.4
2017-18 (SRE)	165,025	9.8	130,644	6.9
2018-19 (FRE)	183,108	11.0	139,469	6.8

Note: SRE: Second Revised Estimates, FRE: First Revised Estimates

Source: JICA Survey Team based on the data in Economic Survey of HP 2019-20 Department of Economics and Statistics HP

In HP, the Minimum Wages Advisory Board was constituted under the Minimum Wages Act-1948 with the purpose of advising the state government in fixing and revising the minimum wage rates of the workers. The state government has increased the minimum wage for the unskilled category of workers from INR 225 to INR 250 per day or INR 6,750 to INR 7,500 per month in 2019 in all existing 19 scheduled employments (Economic Survey 2019-20). Regarding agriculture labourers, daily wages of skilled labour such as carpenters in 2015-16 was increased to INR 375 compared with that in 2008-09 which was INR 192. The wages of unskilled labourers were also increased from INR 146 to INR 256 between 2008 and 2015 (Directorate of Land Records, HP).

Looking into household incomes, more than 23% of rural families in the state was living below the poverty line even though the available data is only during the year 2002-07. Details of the rural poverty categorized by district are shown in Table 2.1.8.

Table 2.1.8 Rural Families Living Below Poverty Line as per 2002-07 Survey

District	Total Number of Rural Households at the Time of Survey	Number of Households below Poverty Line	% Age of Households below Poverty Line to the Total Rural Households
Bilaspur	75,051	17,337	23.10
Chamba	85,676	46,393	54.15
Hamirpur	95,795	19,514	20.37
Kangra	289,185	63,250	21.87
Kinnaur	13,255	2,824	21.31
Kullu	69,388	11,267	16.24
L&S	5,517	2,400	43.50
Mandi	206,096	41,339	20.06
Shimla	108,999	31,682	29.07
Sirmaur	70,439	13,695	19.44
Solan	73,733	17,478	23.70
Una	89,792	15,191	16.92
H.P.	1,182,926	282,370	23.87

Source: Socio-economic Indicator of HP 2014-15, Department of Economics and Statistics HP, and Statistical Year Book of HP 2018-19

(3) Land Holdings

According to the 2010-11 Agricultural Census, the holdings of less than one hectare accounted for 69.8% of the total holdings whereas the area covered by these holdings formed only 28.6% of the total area. In total, around 88.0% of the farmers are taken as marginal or small farmers having less than two hectares of land. Meanwhile 3.2% of the medium and large farmers hold 21.7% of the total area.

Table 2.1.9 Number of Operational Holdings and Area Operated by Size Class of Holdings in the State (2010-11)

	Marginal	Small	Semi-Medium	Medium	Large	Total
	less than 1.0 ha.	1.0 to 2.0 ha.	2.0 to 4.0 ha.	4.0 to 10.0 ha.	10.0 ha. and above	All sizes
No. of Holding	670,425	174,596	84,868	27,606	3,270	960,765
Percentage	69.8%	18.2%	8.8%	2.9%	0.3%	100.0%
Area (Hect.)	273,270	243,942	230,469	156,459	50,511	954,651
Percentage	28.6%	25.6%	24.1%	16.4%	5.3%	100.0%

Source: JICA Survey Team based on the data from Directorate of Land Records HP, Agricultural Census Data Base in HP Statistics Abstract 2018-19 Department of Economics and Statistics HP

The average size of land holdings of the state was 0.99 hectares in 2010-11. Examining the details by district, a remarkable difference can be observed with variation from the smallest value of 0.56 in Kullu to the largest value of 1.96 in Sirmaur as shown in Table 2.1.10.

Table 2.1.10 Operational Holdings and Area by District (2010-11)

District	Number of Holdings	Area (ha.)	Average Size of Holdings (ha)
Bilaspur	57,422	50,662	0.88
Chamba	70,630	54,908	0.78
Hamirpur	76,140	73,502	0.97
Kangra	235,904	201,855	0.86
Kinnaur	10,757	14,227	1.32
Kullu	74,444	41,643	0.56
L&S	4,274	6,743	1.58
Mandi	154,302	127,051	0.82
Shimla	110,005	117,937	1.07
Sirmaur	50,721	99,221	1.96

Solan	53,456	86,619	1.62
Una	62,710	80,285	1.28
H.P.	960,764	954,651	0.99

Source: Socio-economic Indicator of HP 2014-15, Department of Economics and Statistics HP

(4) Literacy and Education

The literacy rate of HP is significantly higher than that of the national average. Only Chamba District shows lower literacy than the national average. Even though there is an apparent difference between men and women, the literacy of women in HP is still higher than the national average of the total population. The literacy rates of scheduled castes (S.C) and scheduled tribes (S.T) are relatively lower than that of total the population in most districts.

Table 2.1.11 Sex-wise Literacy Rate Among Total Population, Scheduled Castes and Scheduled Tribes Population – 2011 Census

District	Total Population			Literacy Rate among S.C. Population			Literacy Rate among S.T. Population		
	Total	Male	Female	Male	Female	Total	Male	Females	Total
Bilaspur	84.6	91.2	78.0	88.0	74.2	81.2	84.6	66.0	75.5
Chamba	72.2	82.6	61.7	79.7	59.3	69.6	80.3	58.0	69.1
Hamirpur	88.2	94.4	82.6	91.9	80.3	85.9	92.6	78.2	85.4
Kangra	85.7	91.5	80.0	88.1	74.7	81.4	82.8	65.7	74.1
Kinnaur	80.0	87.3	71.0	85.6	69.0	77.3	89.2	71.5	80.0
Kullu	79.4	87.4	71.0	83.6	66.1	75.1	90.2	76.0	83.2
L&S	76.8	85.7	66.8	90.0	69.1	80.0	86.9	67.2	76.9
Mandi	81.5	89.6	73.7	85.9	69.1	77.5	83.8	68.2	75.9
Shimla	83.6	89.6	77.1	85.9	71.4	78.8	79.8	70.8	75.5
Sirmaur	78.8	85.6	71.4	81.4	67.5	74.7	69.7	48.7	59.7
Solan	83.7	89.6	77.0	86.7	72.6	79.9	82.5	63.0	73.1
Una	86.5	91.9	81.1	90.8	78.5	84.7	87.8	71.8	80.0
H.P.	82.8	89.5	75.9	86.2	71.5	78.9	83.2	64.2	73.6
India	73.0	80.9	64.6						

Source: HP Statistics Abstract 2018-19, Department of Economics and Statistics HP

2.2 Topography

(1) Topographic Features

HP is geographically different from most Indian states in the plains. The state is almost wholly mountainous with altitudes ranging from 350 metres to 6,975 metres above the mean sea level. Its location is between latitude 30° 22'40" N to 33° 12'40" N and longitude 75° 45'55" E to 79° 04'20" E. It has a deeply dissected topography complex geological structure and a rich temperate flora in the sub-tropical latitudes. Physio graphically, the state can be divided into five zones: (i) wet sub-temperate zone, (ii) humid sub-temperate zone, (iii) dry temperate-alpine high lands, (iv) humid sub-tropical zone, and (v) sub-humid sub-tropical zone. The geological structure of the state falls into four major zones. The outer or sub-Himalayan zone consists mainly of tertiary formations. The lowest Himalayan range mainly composes of granite and other crystalline rocks, the high Himalayan zone composes of granite rocks lacking fossils, and the Tibetan or Tethys Himalayan zone comprises the wide basin covering the Spiti Valley.

(2) Land Resources and Land Utilisation

Due to extreme variation in elevation, great diversity occurs in the land resources and utilisation of the land. The southern part of the state is characterised with intensively cultivated and moderately forested land, while the northern part is represented by high proportion of pastures and other grazing land where the cultivated land and forest area is limited. The central part is relatively moderately cultivated and highly forested with a considerable proportion of pasture and other grazing lands.

Forest land occupies about one-fourth of the total geographical area of the state while pastures and grazing lands cover about 33%. The cultivated area is limited to 12% of the land with the range from 0.4% in Lahaul-Spiti to 55.7% in Kullu District. Major land utilisation of the state by districts is summarized in Table 2.2.1.

Table 2.2.1 Land Utilisation in Year 2016-17

District	Total Geographical Area	Forest Land	Misc. Tree Crops and Groves (not included in net area sown)	Permanent Pastures and Other Grazing Lands	Culturable-Waste	Land Put to Non-agricultural Uses	Barren and Unculturable Land	Current Fallows	Other Fallows	Net Area Sown
	(Ha)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Bilaspur	111,776	12.3	0.1	35.4	4.9	15.4	3.0	1.4	0.9	26.7
Chamba	692,419	39.3	0.0	50.7	1.0	2.0	0.7	0.3	0.1	6.0
Hamirpur	110,224	16.5	0.0	10.4	11.0	11.3	12.6	4.8	1.8	31.6
Kangra	577,681	40.1	1.3	14.6	4.7	13.0	3.4	2.4	0.2	20.2
Kinnaur	624,199	6.2	0.0	51.2	0.5	19.5	21.0	0.2	0.0	1.3
Kullu	65,475	2.5	5.5	10.8	3.4	10.9	4.2	6.3	0.7	55.7
L&S	911,195	15.1	0.0	23.2	0.1	1.8	59.4	0.0	0.0	0.4
Mandi	398,888	44.8	0.0	23.7	1.4	5.6	0.7	0.6	0.4	22.8
Shimla	525,327	28.6	1.5	44.9	2.0	3.6	2.3	2.3	1.4	13.4
Sirmaur	224,759	21.5	17.0	25.6	6.1	5.8	2.8	2.4	0.9	17.8
Solan	180,945	11.2	0.6	43.8	7.2	7.5	6.2	2.2	1.5	19.8
Una	154,854	9.4	5.0	10.6	13.9	13.4	19.2	2.0	1.5	25.1
H.P.	4,577,742	24.6	1.5	32.9	2.7	7.7	17.0	1.2	0.5	12.0

Source: JICA Survey Team based on the data in HP Statistics Abstract 2018-19 Department of Economics and Statistics HP, and Statistical Year Book of HP 2018-19

2.3 Climate and Rainfall

(1) Climate

There is great diversification in climatic condition of Himachal Pradesh due to variation in elevation. However, due to the wide range in altitude, the climate also varies across the state with these following altitude:

- Between an altitude of 400-900 m, it varies from hot and sub-humid tropical in the southern low tract.
- Between 900-1800 m, it is warm and temperate.
- Between 1800-2400 m, it is cool and temperate.
- Between 2400-4800 m, it is cold alpine and glacial in the northern and eastern high mountain ranges.

In terms of climate, Himachal Pradesh is different from most plain states in India due to shorter and less severe summers, higher precipitation, and colder and more prolonged winters. In the state, the year could be divided into three seasons:

- i) Winter season (October to February)
- ii) Summer season (March to June)
- iii) Monsoon season (July to September)

- During the period from October to February, the nights and morning are very cold and the snowfall at an elevation of about 3000 m is about 3 m and this lasts from December to March. About 4500 m is perpetual snow.
- During the summer season from March to June, the weather is very hot and dry. In the hilly regions, due to lower temperature, the climate of the state is comfortable.
- During the monsoon season, the weather tends to be humid during July to September due to rise in moisture content of the atmosphere. These monsoon months are fairly comfortable due to reduced day temperature, although humidity continues to be high in

comparison with the other months. During this time, the landscape of the area becomes lush green. However, heavy rains often cause floods and landslides causing destruction to life and property.

The climatic conditions vary from hot sub-humid tropical in the southern low tracts to temperate, cold alpine and glacial in the northern and eastern high mountains. Lahaul-Spiti experiences drier conditions as it is almost cut off by the high mountain ranges.

(2) Rainfall (Precipitation)

In general, rainfall increases from south to north in HP. However, in Kullu District, the rainfall decreases due to the rain-shadow effect towards Lahaul-Spiti and Kinnaur. Lahaul-Spiti is the driest (below 500 mm). In Lahaul-Spiti, winter and spring precipitation is greater compared with the summer and the autumn. Pre monsoon showers occur in June and post monsoon showers continue till the first week of October but the total amount of both is low. The highest normal monthly rainfall may take place in July or August. Dharamshala experiences maximum precipitation (1055 mm) in July while Dalhousie experiences it (620 mm) in August. Precipitation is also received in the form of snow. The average snowfall above the altitude of 3000 m is about 4 m and lasts for more than four months.

The district wise normal rainfall from is as shown below figures. Normal rainfall per year in each district is more than 700 mm/year.



Source: India Meteorological Department, Ministry of Earth Sciences, New Delhi-110 003 (<http://hydro.imd.gov.in>)

Figure 2.3.1 District Wise Rainfall

2.4 Major Industry and Rural Economy

(1) State Economy and Agriculture Sector

Although the economic growth in the state was predominantly governed by agriculture activities in the past, the economy has shown a shift from the agriculture sector to industries and services as the percentage contribution of agriculture in the total state domestic product has declined from 57.9% in 1950-51 to 26.5% in 1990-91, and further to 8.4% in 2018-19 (Economic Survey 2019-20). However,

the declining share of the agriculture sector does not affect the importance of this sector in the state economy as the growth in the primary sector of the state economy is still determined by the trend in agriculture and horticulture production. It is one of the major contributors to the total domestic product and has overall impact on other sectors via input linkages, employment, trade, and transportation etc. Therefore, a high priority has been accorded to the agriculture sector by the government.

The following describes the growth of the state economy and agricultural and allied sectors.

Table 2.4.1 Growth of Gross State Domestic Product of HP at Constant Prices

(Base=2011-12)

Economic Activity/Sector	2017-18		2018-19		
	GSDP (Quick estimate) (INR in Lakhs)	Growth Rate (%)	GSDP (Actual) (INR in Lakhs)	Growth Rate (%)	Contribution to GSDP (%)
1. Agriculture and Animal Husbandry	901,239	-1.20	964,102	6.98	8.2
2. Forestry and Logging	432,050	-1.42	447,810	3.65	3.8
3. Fishing	8,748	2.32	8,738	-0.11	0.1
4. Mining and Quarrying	31,736	9.78	34,076	7.37	0.3
Total: Primary	1,373,773	-1.02	1,454,726	5.89	12.4
5. Manufacturing	3,173,521	8.53	3,571,652	12.55	30.3
6. Construction	793,672	1.10	819,599	3.27	7.0
7. Electricity, Gas, Water Supply and Other utility services	814,721	2.76	832,694	2.21	7.1
Total: Secondary	4,781,914	6.22	5,223,945	9.24	44.4
8. Transport, Storage and Communications	586,574	7.28	616,962	5.18	5.2
9. Trade, Repair, Hotel and Restaurant.	693,458	0.87	702,277	1.27	6.0
Total: Transport, Communications and Trade Repair, Hotel and Restaurant.	1,280,032	3.71	1,319,239	3.06	11.2
10. Financial Services	430,974	2.20	438,338	1.71	3.7
11. Real Estate, Ownership of Dwelling and Professional Services	987,515	5.48	1,028,793	4.18	8.7
Total: Finance Services and Real Estate	1,418,489	4.46	1,467,131	3.43	12.5
12. Public Administration	549,683	18.30	627,171	14.10	5.3
13. Other Services	1,073,839	21.57	1,174,878	9.41	10.0
Total: Community and Personal Services	1,623,522	20.44	1,802,049	11.00	15.3
Gross State Value Added at basic prices	10,477,731	6.59	11,267,091	7.53	
Gross State Domestic Product	10,974,753	6.51	11,775,086	7.29	100
GSDP Growth (%)		6.5		7.3	

Source: JICA Survey Team based on the data in HP Statistics Abstract 2018-19 Department of Economics and Statistics HP

The gross state domestic product (GSDP) of HP at constant prices (with base of year 2011-12) for the year 2018-19 achieved INR 117,750 crore as against INR 109,747 crore for 2017-18 indicating a growth of 7.3%. According to the Economic Survey 2019-20, the growth rate for 2019-20 is expected to be around 5.6% as per the advanced estimates and on the basis of economic conditions up to December 2019.

The growth of the state economy is highly supported by public administration and manufacturing. Agriculture and allied sector, a key sector supporting about 60% of the population, contributes to only 8.2% of the total GSDP even though it recovered its growth rate from the negative growth in 2017-18 to nearly seven percent in 2018-19.

(2) Rural Economy

There are more than four lakhs of establishments that operate for economic activities in HP, out of which 81% are engaged in the rural areas. Nearly ten lakhs of persons are employed in these establishments with 76% of employment belonging to rural areas. Therefore, the development of establishments is important in the rural economy of the state.

Out of 412,240 establishments in the whole state, more than one-fourth of the establishments are concentrated in Kangra District, followed by Mandi District where 13% of the establishments are located. Meanwhile, the concentration of establishment per thousand population is highest in Lahaul-Spiti (97 establishments per thousand population), followed by Kinnaur District (77 establishment per thousand population).

In terms of industrial units, there are 5,062 registered factories in HP where 3.4 lakhs of people work. In total 4,441 of small-scale industrial units operate in HP with 8,405 crore of investment. More than half of the registered factories and almost one-fourth of the small-scale industrial units are established in Solan District, where there are 15 industrial areas and together with medium units there are 5,649 micro, small and medium enterprises functioning in the district (Brief Industrial Profile of Solan District 2016-17).

Table 2.4.2 Number of Establishments, Small Scale Industrial Units and Registered Factories and Workers (2018-19)

District	Establishments				S.S.I. Units			Registered Factories	
	No. of Establishment			No. of Workers	No. of S.S.I Units	Investment (INR in Crore)	No. of Workers	No. of Factories	No. of Workers
	Total	Own Account	With Hired Workers						
Bilaspur	24,542	16,544	7,998	49,525	631	4,212.91	2,774	102	4,892
Chamba	20,722	14,661	6,061	42,650	122	177.29	996	86	2,429
Hamirpur	31,125	23,836	7,289	59,082	147	20.84	1,599	200	1,001
Kangra	104,474	82,872	21,602	190,513	503	70.26	2,858	492	10,805
Kinnaur	6,538	4,498	2,040	18,332	159	6.69	423	11	2,212
Kullu	33,254	26,045	7,209	64,537	318	39.61	2,687	200	2743
L&S	3,118	2,164	954	9,971	0	0	0	-	-
Mandi	57,324	44,111	13,213	110,285	353	66.85	3,401	182	4,175
Shimla	40,835	27,547	13,288	110,558	429	55.35	2,923	178	6,829
Sirmaur	23,122	15,542	7,580	76,868	342	154.67	4,670	669	50,943
Solan	40,293	25,840	14,453	174,920	1,055	3,512.83	17,609	2,579	219,646
Una	26,893	19,585	7,308	69,947	382	88.19	3,276	294	22,797
H.P.	412,240	303,245	108,995	977,188	4,441	8,405.49	43,216	4,993	329,472

Note: Data of registered factories as per 2017.

Source: HP Statistics Abstract 2018-19, Statistical Yearbook of HP 2018-19, and HP 6th Economic Census 2015

According to the 6th Economic Census 2015 of HP, establishments that are engaged in the agriculture sector are limited to 7.8% of the total establishments. Under the agriculture sector, 96% of the establishments were situated in rural areas. Details of the agriculture establishments are described in Table 2.4.3.

Table 2.4.3 Number of Agriculture Establishments by Activity and Type of Establishments

Major Activity Group	Own Account		With Hired Workers		Total	
	No.	Percentage	No.	Percentage	No.	Percentage
Agricultural Service	1,333	4.3	109	13.2	1,442	4.5
Livestock	28,206	90.3	570	69.2	28,776	89.8
Forestry and Logging	466	1.5	112	13.6	578	1.8
Fishing and Aqua Culture	1,227	3.9	33	4.0	1,260	3.9
Agriculture Sector Total	31,232	100	824	100	32,056	100
Non-agriculture Sector Total	272,013		108,171		380,184	
Total H.P.	303,245		108,995		412,240	

Source: HP 6th Economic Census 2015

As seen in the table above, out of the total agriculture sector establishments, only 4.5% is engaged in agriculture services. Majority of the agriculture establishments are operating livestock activities. The

Economic Census also revealed that 58.6% of the agricultural establishments are perennial, 30.7% are seasonal, and 10.7% are working on a casual basis. Under the agriculture sector most of the establishments associated with agricultural service activities are managed by one or two workers. Out of 1,442 agricultural establishments, 21 are under the control of the government.

(3) Cooperative Societies

Cooperative societies play an important role to ameliorate the socioeconomic condition of people in rural areas. The primary aim is to eliminate exploitation carried out by middleman and money lenders by ensuring credit facilities to farmers at low rate of interest through cooperatives. HP has pioneered the cooperative movement in 1904 and 5,038 cooperatives of various kinds are currently functioning in the state.

Cooperative societies provide multi services, which include distribution of consumer goods under the public distribution system. Service include the distribution of fertilizers and other agricultural related inputs and implements, collection of milk and its marketing through milk cooperatives, advancement of loans through Primary Agricultural Cooperative Societies (PACS) and other cooperative financial institutions, marketing of agricultural and horticultural produces, production of handicraft products, fisheries, transportation services. Cooperative societies related to agricultural activities are the following: Primary Agriculture Credit Cooperative Society, Regional Cooperative Marketing Society, and Wholesale Primary and Student Consumer Cooperative Stores.

Primary Agricultural Cooperative Societies provide loan and credit to the members/farmers at reasonable interest rates to meet their various needs. These societies are also engaged in the distribution of controlled/non-controlled consumer goods, fertilizers and marketing of their agriculture produce. Table 2.4.4 describes the details of the major cooperative societies related to the agriculture sector in each district.

Table 2.4.4 Cooperative Societies in HP (2017-18)

District	Primary Agriculture Credit Cooperative Society			Non-Agricultural Credit Cooperative Society			Regional cooperative Marketing Society			Wholesale Primary and Student Consumer Cooperative Stores		
	No. of Society	Member ship ('000)	Working capital (INR in Crore)	No. of Society	Members hip	Working capital (INR in Crore)	No. of Society	Member ship	Working capital (INR in Crore)	No. of Society	Member ship	Working capital (INR in Crore)
Bilaspur	79	77	474.7	21	2,721	12.8	1	95	1.75	20	5,394	0.99
Chamba	128	51	18.7	16	2,004	1.5	3	57	3.43	34	2,193	0.70
Hamirpur	224	189	1387.6	30	3,358	20.5	0	0	0	8	962	0.14
Kangra	602	415	2075.4	63	9,031	53.9	5	2,130	2.08	45	6,745	1.28
Kinnaur	35	14	10.4	2	169	0.37	2	346	13.48	11	1,998	0.85
Kullu	124	27	15.6	16	1,290	1.9	5	651	2.30	33	1,229	1.27
L&S	52	8	5.4	2	75	0.02	3	132	0.88	15	1,827	1.77
Mandi	226	112	137.8	25	63,769	215.8	4	211	1.13	81	17,079	3.05
Shimla	171	51	31.1	112	8,843	46.0	11	376	8.48	88	9,740	8.27
Sirmaur	120	49	87.8	39	14,431	84.0	2	173	1.06	19	1,000	0.38
Solan	157	59	89.6	100	16,126	131.4	4	454	4.90	12	4,142	0.81
Una	214	211	1811.2	27	4,688	22.2	0	0	0	0	0	0
H.P.	2132	1,263	6146.0	453	126,505	590.5	40	4,625	39.5	366	52,309	19.5

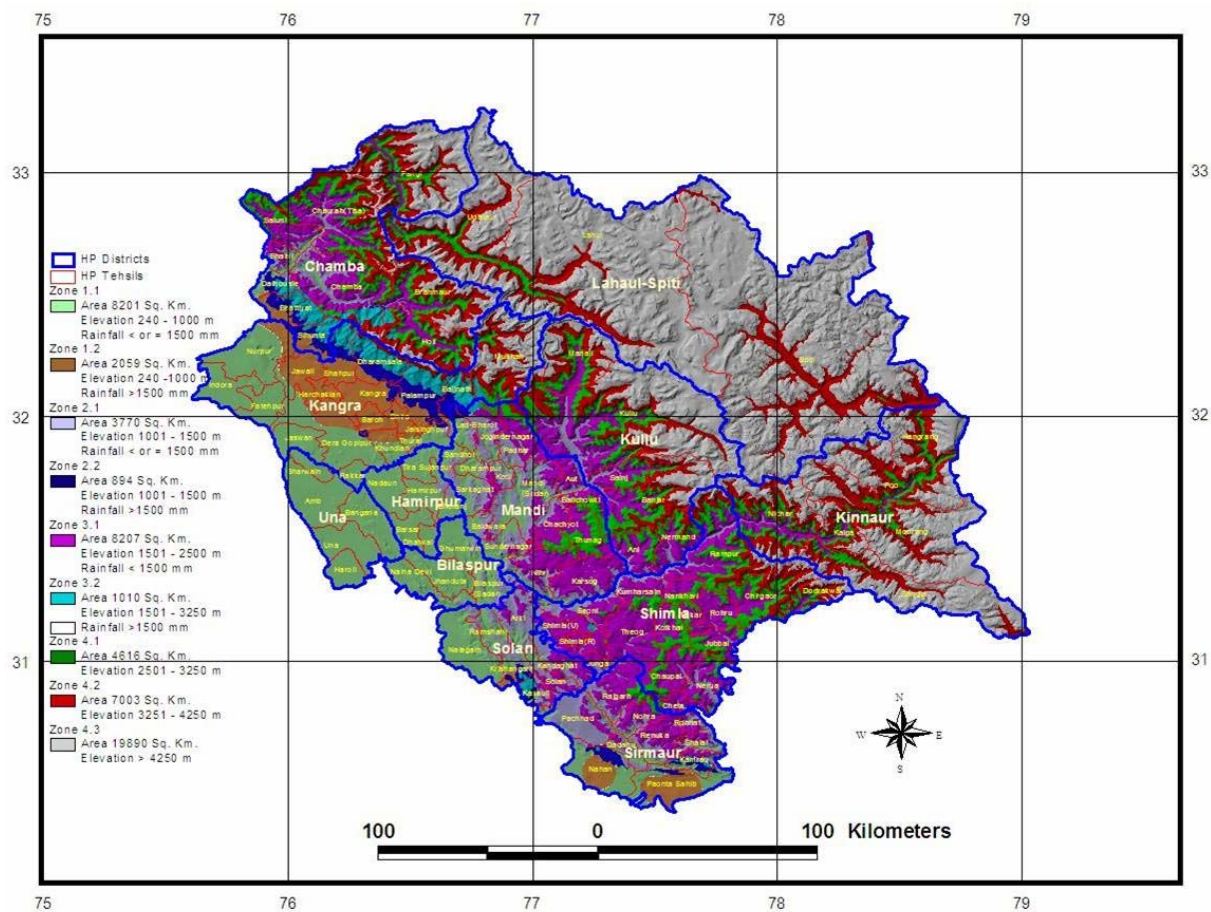
Source: HP Statistics Abstract 2018-19

2.5 Agro-Ecology

Himachal Pradesh is almost wholly mountainous with altitudes ranging from 300 m to 7,000 m above the mean sea level. The climate varies between hot and humid in the valley areas to freezing cold in the home of perpetual snow.

Agro-Ecological Zones (AEZ) is a methodology to separate areas with similar sets of potentials and constraints (homologous areas) for development. It is a method that uses biophysical attributes of land such as elevation, climate, land use, soils, etc., to cluster areas into homogeneous units. This exercise

facilitates planning for the sustainable use of natural resources. Agro-climatically, the state has been divided into four zones, keeping in view the altitude, rainfall, and temperature as shown in Figure 2.5.1. The major features of the respective AEZ are shown in Table 2.5.1.



Source : Department of Statistic and Information, HP

Figure 2.5.1 Agro-Ecological Zones in Himachal Pradesh

Table 2.5.1 Agro-ecological Zones in Himachal Pradesh

Zone		Area in km ² (% of total area)	Elevation (m)	Mean Annual Temperature (°C)	Soil Type	Rainfall (mm)	Field Crops	Fruits	Problems
Sub-tropical Sub-mountain and Low Hills	Zone 1.1	8,201 (14.7%)	240-1,000	15 to 23	Sandy loam (light texture, shallow)	≤ 1,500	Wheat, maize, paddy, pulses, oilseeds, barley, sugarcane, potato, watermelon and vegetables	Mango, Litchi, Pear, Citrus, Aonla, and Pomegranate	Excessive run-off and soil erosion. Erratic distribution of rainfall. Lack of suitable soil and water conservation measures. Low inherent fertility of soil. Low moisture retention capacity.
	Zone 1.2	2,059 (3.7%)	240-1,000	19- 22	Loamy sand (medium in depth)	>1,500	Wheat, paddy, maize, seed pot, pulses, oil seeds.		
Sub-humid Mid Hills	Zone 2.1	3,770 (6.8%)	1,001-1,500	14 - 22	Sandy loam-clay loam (acidic)	≤ 1,500	Wheat, paddy, barley, pulses, oil seed, off season vegetables.	Peach, Plum, Apricot, Pear, Walnut Kiwi fruit, Almond, and Strawberry,	Excessive run-off and soil erosion. Soil acidity and cloud formation. Low temperature during winter. Lack of suitable soil and water conservation measures. High incidence of weeds and diseases.
	Zone 2.2	894 (1.6%)	1,001-1,500	16 - 21	Silt loam-loam	>1,500	Wheat, paddy, barley, pulses, oil seed, off season vegetables in some parts.		
Wet Temperate High Hills	Zone 3.1	8,207 (14.7%)	1,501-2,500	9 - 21	Mainly loamy shallow, acidic	≤ 1,500	Wheat, barley, maize, millets, pulses, oilseeds.	Apple, Pear, Cherry, Almond, and Walnut, Chestnut	Landslides and severe soil erosion. Shallow depth soil suboptimal temperature. Periodic moisture stress to crops land on higher reaches, lack of irrigation facilities. Poor road network to supply inputs and marketing of farm produce.
	Zone 3.2	1,010 (1.8%)	1,501-3,250	15 - 21	Sandy loam shallow to medium depth.	>1,500	Maize, wheat, pulses, oilseeds.		
Dry Temperate High Hills	Zone 4.1	4,616 (8.3%)	2,501-3,250	9 - 20	Sandy loam (shallow in depth)	<700 (Dry)	Wheat, potato, barley, buckwheat, peas minor millets, kuth and temperate vegetables, hops, cumin and saffron.	Apple, Hops, Grape, Apricot, Almond, and Seebuckthorn	Landslide and severe soil erosion due to loose strata and absence of adequate vegetation. Shallow depth of soil having coarse texture short growing season. (May to October) Lack of vegetation cover. Glacier movements. Low temperature.
	Zone 4.2	7,003 (12.6 %)	3,251-4,250	9 - 20	Sandy loam (shallow)	Dry / snow	Quality potato seeds, temperate and European type vegetables, barley, buckwheat.		
	Zone 4.3	19,890 (35.8%)	> 4,250	9 - 20	Sands and pebbles (loose texture)	Dry / Snow	Buck wheat, barley, minor millets and kala zeera.		

Source: DPR, DOA and Strategies for Doubling Farmers' Income in Himachal Pradesh 2018

2.6 River System and Water Resources Utilization

Water is one of the most vital natural resources of Himachal Pradesh. The state is richly endowed with a hilly terrain having an enormous volume of water from the catchment areas of Satluj, Beas, Ravi, Yamuna and Chenab rivers. As such, the state has enormous potential of water resources in the form of glaciers and rivers but ground water resources are limited. Availability of Water resources in Himachal Pradesh is as follows.

2.6.1 Glaciers

Glaciers are located in higher Himalayan reaches (above 4000 m) in PirPanjal, Dhauladhar, Zaskar and Great Himalayan ranges. There are 800 Glaciers in the Himachal Himalayas which are 199 higher in number as compared to the previous report of 601 Glaciers in the state reported in the state development report in 1991. This variation is due to breaking of large glaciers into smaller ones with the increasing temperature in past two decades. According to the investigations carried in the Himachal Himalayas, there are a total of 334 glaciers in the entire Satluj Basin which includes the information about the Beas, Sainj, Spiti, Baspa basins and 457 glaciers in Chenab basin. The total area covered by these glaciers in Satluj and Chinab basins is 2175 km². Besides the glaciers there are 2679 permanent snowfields in these basins with a total area of 1775.189 km². Out of 334 glaciers in the entire Satluj basin, 202 glaciers are located in the Himachal Pradesh.

2.6.2 Surface water Resources

Most of the surface water resources of the state flow from perennial rivers which originate from glaciers. The flow in these rivers is further augmented by run-off from the catchment area.

(1) Rivers

90% of Himachal Pradesh's drainage forms the part of Indus river system. Himachal Pradesh provides water to both the Indus and Ganges basins. The major rivers of the state are the Chenab, the Ravi, the Beas, the Sutlej and the Yamuna. These rivers are perennial and are fed by snow and rainfall. They are protected by an extensive cover of natural vegetation.

- The Chenab is the largest river (in terms of volume of water) is formed after the meeting of two streams namely, Chandra and Bhaga at Tandi, in Lahaul. It flows 122 kilometres and covers an area of 7,500 square kilometres in Himachal, before entering Kashmir. The Chandra passes through the barren tribal land.
- The origin of river Ravi is Bara Banghal in Kangra district as a joint stream formed by the glacier feed Bhadal and Tantgari. The river is about 158 kilometres long and has a catchment area of nearly 5,451 square kilometres. Chamba lies on its right bank of this river.
- The Beas rises in the PirPanjal range near the Rohtang Pass and flows about 256 kilometres in Himachal Pradesh. The river is formed by a numerous of tributaries; the major tributaries are the Parbati, the Hurla, the Sainj, the Uhl, the Suheti, the Luni, the Banganga and the Chaki. The northern and eastern tributaries of the river are snow fed and perennial, while the southern ones are seasonal. During the month of August, increase in the inflow sometimes results in floods.
- The Sutlej originates in distant Tibet. The river cuts through both the great Himalayan and the Zaskar ranges and crosses the Indo-Tibetan border (near Shipkila). Then the river Spiti joins Sutlej from the north. Passing through gorges it emerges from the mountains at Bhakra. The catchment area of Sutlej in Himachal Pradesh is about 20,000 square kilometres.
- The Yamuna has its origin in Yamunotri in Uttarkashi district, Uttarakhand. Its total catchment area in Himachal Pradesh is 2,320 square kilometres (900 sq mi). Its tributaries are the Tons, the Giri and the Bata.

(2) Lakes

There are a number of small and large lakes in Himachal Pradesh. Most important representing the water budget for the state are 21. Major Lakes of Himachal Pradesh contributing as a water reservoir are as follows.

Table 2.6.1 Major Lakes of Himachal Pradesh

Sr. No.	Name of Lake	District	Altitude	Area/hectare
1	Bhrigu	Kullu	4,240	3
2	Dashair	Kullu	4,200	4
3	Mantalai	Kullu	4,160	3
4	Seruvalsar	Kullu	3,301	0.5
5	Prashar	Mandi	2,600	1
6	Rewalsar	Mandi	1,320	3
7	Nako	Kinnaur	3,604	49
8	Chandertal	Lahaul-Spiti	4,280	49
9	Surajtal	Lahaul- Spiti	4,800	3
10	Chandernahan	Shimla	3,960	1
11	Dal	Kangra	1,840	2
12	Kareri	Kangra	2,960	3.5
13	Pong Dam	Kangra	430	21,712
14	Mani Mahesh	Chamba	4,200	2
15	Gauri Kund	Chamba	4,000	0.5
16	Khajjar	Chamba	1,920	5
17	Lam Dal lake	Chamba	3,640	5
18	Gadhasaru	Chamba	4,280	1
19	Mahakali	Chamba	4,355	2
20	KhundiMaral	Chamba	3,750	3
21	Renuka	Sirmaur	600	15

Source : DIRECTORY OF WATER RESOURCES IN HIMACHAL PRADESH, State Centre on Climate Change

2.6.3 Groundwater Resource

At present there are 128 Ground Water Monitoring Station (GWMS) in Himachal Pradesh under Central Ground water Board.

The groundwater resources occur mainly in unconsolidated sediments of intermountain valleys and in the sub montane tract. Kangra, Una, Hamirpur, Bilaspur, Mandi, Solan and Sirmaur districts, particularly their valley areas depend upon groundwater. The exploitation is done through open wells, tubewells, infiltration galleries and wells.

Table 2.6.2 District wise report of Ground water as per Central Ground Water Board

Sr. No.	District	No. of wells drilled	Depth Range (m)		Discharge (lps)		Quality of Ground Water
			Minimum	Maximum	Minimum	Maximum	
1	Hamirpur	10	40	100	0.33	18	Good
2	Kangra	29	23.5	432	0.01	56.83	Good
3	Kullu	9	18	101	4.98	17.98	Good
4	Mandi	19	38.25	140.98	0.25	16.65	Good
5	Sirmaur	12	90	163	3.33	53.66	Good
6	Solan	16	65	300	0.02	32.8	Good
7	Una	56	51	220	2	55	Good
8	Bilaspur	6	31.8	115	7.7	20.75	Good
9	Shimla	1	-	302	-	19.55	Good
10	Chamba	-	-	-	-	-	-
11	Kinnaur	-	-	-	-	-	-
12	Lahaul Spiti	-	-	-	-	-	-

Source : Central ground water board

2.6.4 Traditional water sources

As there is an imbalance between the supply and consumption of water, particularly by the poor and weaker sections of the society, the traditional sources of water play a significant role. These include springs, Kuhls, Baories, Ponds, Khatries and ditches particularly in Himachal Pradesh. These systems supplement the water requirements of the rural and urban areas.

Chapter 3 Present Condition of Agriculture Sector in the Survey Area

3.1 National and State Policy and Plan for Agriculture Sector

3.1.1 Major National Policies and Schemes on Agriculture Sector

The Government of India (GoI) has promoted its economy through the Five-Year Plans (FYPs) since 1947, which are centralised and integrated national economic programs. The policy for agriculture development has been integrated in the FYPs. However, the FYPs ended its role after the dissolution of the Planning Commission that formulated, executed, and monitored the FYPs in 2014. The role of the Planning Commission was replaced by a think tank called the NITI Aayog (an acronym for National Institution for Transforming India). The GoI, after the completion of the latest 12th FYP in 2017, set the target of doubling farmers' income by 2022 as the national agriculture policy.

(1) Major National Policies on Agriculture

(a) Doubling Farmers' Income by 2022

The GoI, realising the past strategies that focused primarily on raising agricultural output and improving food security did not necessarily promote farmers' welfare, expressed a new policy of "Doubling Farmers' Income by 2022". The new policy redefines the agriculture approach from a production-centric perspective to an income-centric viewpoint in order to promote farmers' welfare, reduce agrarian distress, and bring parity between the income of farmers and those working in non-agricultural sectors. In this policy, the government emphasises the following areas as the major sources of the growth of the agricultural sector to double farmers' income:

- i) Improvement in productivity,
- ii) Improvement in total factor productivity,
- iii) Increase in cropping intensity,
- iv) Diversification towards high value crops,
- v) Shifting cultivators from farm to non-farm occupations, and
- vi) Improvement in terms of trade for farmers or real price received by farmers.

Due to the limitation in the expansion of area under cultivation and the current low yield compared with the world average, improvement in productivity and increase in cropping intensity are still important to raise agricultural output. Enhancing access to irrigation and technological advancement are potent instruments to raise agricultural productivity. The improvement in total factor productivity through resource use efficiency contributes to saving in cost of production. The policy also emphasises the importance of market reforms for the realisation of better price for farmers.

Regarding diversification, the policy underlines the increase of income by shifting from staple crops to commercial crops. A study estimated the average productivity of high value crops as INR 141,777 per hectare, which is three times more than that of the staple crops. To achieve its contribution to double farmers' income by 2022, the area under high value crops is required to increase by 4.4% each year¹.

(b) Vision 2030

The Indian Council of Agricultural Research (ICAR) developed a strategic framework for innovation-led, inclusive, and sustainable agricultural growth documented as 'Vision 2030'. It narrates key challenges and opportunities in the agriculture sector as follows:

- i) To develop and promote technologies that raise agricultural income and ensure employment opportunities in the agri-supply chain,
- ii) To evolve technologies and management options to suit the needs of smallholders' agriculture,

¹ National Institution for Transforming India, Government of India (2017) 'Doubling Farmers' Income, Rational, Strategy, Prospects and Action Plan'

- and to involve them in agri-supply chain through institutional innovations,
- iii) To stop further degradation and rehabilitate degraded lands and water resources in a cost-effective manner,
 - iv) To develop promising technologies and management options to raise productivity in a situation of deteriorating production environment,
 - v) To evolve institutional arrangements for production, post-harvest, and marketing of high value and perishable commodities as well as their value-added products, and
 - vi) To evolve mechanisms for linking front-end activities of agricultural supply chain with its back-end activities of farm production.

It also mentions the importance of agricultural diversification as a research focus. Research priority is laid on competitiveness of high value commodities, development of genotypes, and management practices for raising productivities of these commodities in different agro-eco-regions, consumer-preferred quality traits, and food safety.

(2) Schemes of Central Government on Agriculture Sector

The Government of India, to achieve its policy and vision on agricultural development, sets several different schemes. The National Food Security Mission (NFSM), National Mission on Sustainable Agriculture (NMSA), and National Mission on Agriculture Extension and Technology (NMAET) provide broad guides on agricultural development with specific component supports. Rashtriya Krishi Vikas Yojna (RKVY) is an umbrella scheme aiming at facilitating the increase of public investment in agriculture sector by state governments. For the irrigation and infrastructure development for agriculture, the Rural Infrastructure Development Fund (RIDF), Pradhan Manti Krishi Sinchayee Yojna (PMKSY), and Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan Scheme (PM-KUSUM) are available as fund sources. The Central Government also provides insurance schemes for agriculture through Rashtriya Krishi Bima Yojna (RKBY), Weather-based Crop Insurance Scheme (WBCIS), and Pradhan Mantri Fasal Bima Yojna (PMFBY). Moreover, the scheme of Pradhan Mantri Kisan Samman Nidhi Yojna (PM-KISAN) provides direct cash transfer to farmers to supplement their financial needs. Marketing is promoted through the Promotion of Farmers' Producer Organisations Scheme and E-National Agriculture Market (E-NAM). Most of the central schemes provide funding resources to the state governments for specific objectives and activities with some percentage share of the state governments. State governments adopt the central schemes and apply for the funding from the central schemes. Therefore, the funding from central schemes can be utilised in convergence with state initiatives or schemes. Main schemes on agriculture and allied sectors initiated by the central government are summarised in the following table.

Table 3.1.1 Agriculture Related Schemes Sponsored by the Central Government

Name of Scheme	Positioning	Aim	Issues Covered	Year Launched	Budget for HP (INR in crore)	Budget Share
National Food Security Mission (NFSM)	Currently revamped programme is operated	To increase production of rice, wheat, coarse cereal (maize), pulses and promotion of nutri-cereals, restoring soil fertility, creating employment opportunities and enhancing farm level economy.	Revamped programme covers eight components viz. (i) NFSM- Rice; (ii) NFSM-Wheat; (iii) NFSM-Pulses; (iv) NFSM-Coarse Cereals (Maize, Barley), (v) NFSM-Sub Mission on Nutri Cereals; (vi) NFSM-Commercial Crops; (vii) NFSM-Oilseeds and Oilpalm; and (viii) NFSM-Seed Village Programme. <u>*Seed Village Programme:</u> to develop strengthening of infrastructure facilities for production and distribution of quality seeds. In HP, covered crops are rice, wheat, coarse cereal (maize), pulses and nutri-cereals (from 2018). Areas covered in HP are two districts for rice, 11 districts for wheat, 12 districts for pulses and coarse cereals. Activities adopted in HP are cluster development, seed distribution, integrated nutrient management, integrated pest management, flexi interventions including farm machinery, efficient water application tools, training and events/workshop for creating awareness, publicity and construction of RCC tanks.	2007 (2012 in HP)	16.50 (2019-20) 12.48 (2020-21)	Central: 90% State: 10%
National Mission on Sustainable Agriculture (NMSA)	One of the eight missions outlined under the National Action Plan on Climate Change (NAPCC).	To promote sustainable agriculture focusing on ten key dimensions encompassing Indian agriculture namely: 'Improved Crop Seeds, Livestock and Fish Cultures', 'Water Use Efficiency', 'Pest Management', 'Improved Farm Practices', 'Nutrient Management', 'Agricultural Insurance', 'Credit Support', 'Markets', 'Access to Information', and 'Livelihood Diversification'	Components: 1. Rainfed Area Development (RAD), 2. Sub Mission on Agroforestry (SMAF), 3. National Bamboo Mission (NBM), 4. Soil Health Management (SHM), 5. Climate Change and Sustainable Agriculture: Monitoring, Modelling and Networking (CCSAMMN)	2010	24.48 (2019-20)	Central: 90% State: 10%
Rainfed Area Development (RAD)	A component of the National Mission for Sustainable Agriculture (NMSA)	To enhance agricultural productivity especially in rain fed area focusing on integrated farming, water use efficiency, soil health management and synergizing resource conservation	Two types of activities, namely, Integrated Farming System and Value Addition and Resource Conservation, are covered and being implemented in cluster of 100 ha contiguous area with less than 30% of the irrigation facilities. Activities for assistance are integrated farming system, value added resource conservation system including apiculture, silage making, greenhouse structure, water harvesting and management, and water lifting devices.	2014 (in HP)	6.8 (2019-20) 8.9 (2020-21)	

Name of Scheme	Positioning	Aim	Issues Covered	Year Launched	Budget for HP (INR in crore)	Budget Share
Soil Health Management (SHM)	A component of National Mission for Sustainable Agriculture (NMSA) implemented by the State Government, National Centre for Organic Farming, CFQC&TI, and Soil and Land Use Survey of India	To promote location and crop specific sustainable soil health management, creating and linking soil fertility maps with macro-micro nutrient management, judicious application of fertilisers and organic farming practices.	<p>Components:</p> <ol style="list-style-type: none"> 1. Soil Health Card 2. Soil Health (Soil testing and balanced use of fertilisers) 3. Strengthening of Central Fertiliser Quality Control & Training Institute (CFQC&TI) 4. Integrated Nutrient Management (INM) Organic Component 5. PKVY 6. Strengthening of National Centre of Organic Farming <p>Assistance is provided for various improved package of practice based on land use and soil characteristics, and support to reclamation of problem soil.</p> <p><u>*Soil Health Card:</u> Farmers get Soil Health Card every three years with report and advisory based on the soil nutrient status of a farmer's holding to show recommendations on dosage of different nutrients needed, on the fertilisers and their quantities, soil amendments.</p>	2014		Central: 50% State: 50%
Prampragat Krishi Vikas Yojna (PKVY)	An extended component of Soil Health Management (SHM) under the National Mission on Sustainable Agriculture (NMSA)	To support and promote organic farming, in turn resulting in improvement of soil health	<p>Promoting organic farming through :</p> <ul style="list-style-type: none"> - Formation of PKVY/PGS group of minimum of 20 farmers, and clusters for 500-1000 ha of organic farm. - Model organic cluster demonstrations at the farmers' field in cluster of 20 ha. - Adoption of Participatory Guarantee System (PGS) Certification - Manure management and biological nitrogen harvesting - Model organic farm <p>Assistance:</p> <ul style="list-style-type: none"> - Financial assistance for procurement of on-farm inputs and materials for marketing - Development of post-harvest, value addition and processing facilities - Brand building, trade fair, exhibitions, local publicity, and marketing initiatives 	2015	2.27 (2019-20)	Central: 90% State: 10%
National Mission on Agriculture Extension and Technology (NMAET)	A successive scheme of the Modified Extension Reforms Scheme introduced in 2010 under the umbrella of Agriculture Technology Management Agency (ATMA).	To restructure and strengthen agricultural extension to enable delivery of appropriate technology and improved agronomic practises to the farmers	<p>4 Sub Missions:</p> <ol style="list-style-type: none"> (i) Sub Mission on Agricultural Extension (SMAE) (ii) Sub Mission on Seed and Planting Material (SMSP) (Seed Village Programme was currently shifted to NFSM) (iii) Sub Mission on Agricultural Mechanization (SMAM) (iv) Sub Mission on Plant Protection and Plant Quarantine (SMPP) 	2014	33.00 (14.83 for SMAM) (2019-20)	Central: 90% State: 10%

Name of Scheme	Positioning	Aim	Issues Covered	Year Launched	Budget for HP (INR in crore)	Budget Share
Rashtriya Krishi Vikas Yojna (RKVY)	An umbrella scheme for ensuring holistic development of agriculture and allied sector	To incentivise the state to increase public investment in agriculture and allied sectors, to provide flexibility and autonomy to the states in the process of planning and executing agricultural schemes, to ensure the preparation of agriculture plans for the districts and states based on agro-climatic conditions, availability of technology and natural resources, to ensure that the local needs and priorities are reflected in the plan, to reduce yield gaps in important crops, to maximise returns to farmers, and to bring about quantifiable changes in the production and productivity.	States are given autonomy for selection, planning, approval and execution of projects/programs under the scheme as per their needs, priorities and agro-climate requirements. Under Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR), major focus is on pre- and post-harvest infrastructure, besides promoting agri-entrepreneurship and innovations. Activities adopted in HP are: - Creation of pre-/post-harvest agri-infrastructure, increase access to quality inputs, storage, and market facilities - Promotion of value chain addition linked production models - Mitigation of risk of farmers through additional income generation - Empowering youth through skill development, innovation and agri-entrepreneurship-based agribusiness models	2007	26.78 (2019-20)	Central: 90% State: 10%
Rural Infrastructure Development Fund (RIDF)	Concessional loans given by NABARD to state government and state-owned corporations for projects in certain selected sectors.	For development of rural infrastructure in the field of agricultural and related sector, social sector and also in rural connectivity	45 projects are identified for availing financial assistance under RIDF. Eligible work includes works related to agriculture and irrigation, soil conservation, flood protection, social sector project and rural connectivity. In 2019-20 the State Government of HP applied the fund for <i>Mukhya Mantri Nutan Polyhouse Yojna</i> (MMNPY)	1995	78.59 for MMNPY (2019-20)	NABARD: 95% (for agriculture sector on reimbursement basis)
Pradhan Manti Krishi Sinchayee Yojna (PMKSY)	Amalgamating ongoing schemes viz. Accelerated Irrigation Benefit Programme (AIBP) of MoWR, RD&GR, Integrated Watershed Management Programme (IWMP) of DoLR and the On Farm Water Management (OFWM) of DAC	To achieve convergence of investments in irrigation at the field level, expand cultivable area under assured irrigation, improve on-farm water use efficiency, and enhance the adoption of precision-irrigation and other water saving technologies	To adopt a 'decentralized state level planning and project execution' structure that will allow the states to draw up their own irrigation development plans based on District Irrigation Plan (DIP) and State Irrigation Plan (SIP) Components: - AIBP (accelerating completion of ongoing major and medium irrigation project) - 'Har Khet ko pani' (extending the coverage of irrigation) - 'More crop per drop' (improving water use efficiency) - Watershed development	2015	22.0 (2019-20) (14.22 for 'More crop per drop')	Central: 90% State: 10%

Name of Scheme	Positioning	Aim	Issues Covered	Year Launched	Budget for HP (INR in crore)	Budget Share
Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan Scheme (PM-KUSUM)	Operated by the Ministry of New and Renewable Energy (MNRE), being implemented through state government agencies.	Aims to add solar and other renewable capacity of 25,750 MW by 2022, targeting installation of farm solar pumps and grid connected solar and other renewable power plants in the country.	Components; A. 10,000 megawatts (MW) of decentralised ground mounted grid-connected renewable power plants. B. Installation of 17.50 lakh standalone solar powered agriculture pumps. C. Solarisation of 10 lakh grid-connected solar powered agriculture pumps. Assistance for installation of solar pumps, solarisation of existing grid-connected agricultural pumps and installation of grid-connected renewable power plants. HP adopted the scheme in convergence with the state schemes of 'Saur Sinchayee Yojna (SSY)'		5.0 (2019-20)	Out of 85% of the total of 75.25 crore for 3years (2020-23), 50% from PM-KUSUM and 35% from SSY
Rashtriya Krishi Bima Yojna (RKBY)	One of the components of the National Crop Insurance Programme	Aiming at supporting sustainable production in agriculture sector, thereby ensuring food security, crop diversification and enhancing growth and competitiveness of agriculture sector besides protecting farmers from production risks	1. To provide insurance coverage and financial support to the farmers in the event of failure of crop as a result of natural calamities and diseases. 2. To encourage the farmers to adopt progressive farming practices, high value inputs and higher technology in agriculture. 3. To help stabilise farm incomes, particularly in disaster years. Crops covered for the insurance in RKBY are food crops (cereals, millets & pulses), oilseeds, annual commercial / horticultural crops. Currently in HP, wheat, barley, maize, paddy, potato, and ginger are covered depending on the district.	1999 (modified scheme was launched in 2014)		Central: 50% State: 50%
Weather Based Crop Insurance Scheme (WBCIS)	One of the components of the National Crop Insurance Programme	To mitigate the hardship of the insured farmers against the likelihood of financial loss on account of anticipated crop loss resulting from weather conditions including fluctuation in rainfall, temperature, wind, humidity, etc.	The scheme covers major food crops (cereals, millets & pulses) & oilseeds as well as commercial / horticultural crops. In HP, during Kharif, 2019 season, six crops, i.e., potato, ginger, tomato, peas, cabbage and cauliflower, while during Rabi, 2019-20 season, four crops, i.e., tomato, potato, garlic and capsicum, are covered under R-WBCIS. Premium rates depend on crop and district.	2008 (Further, restructured R-WBCIS was launched in 2016)		

Name of Scheme	Positioning	Aim	Issues Covered	Year Launched	Budget for HP (INR in crore)	Budget Share
Pradhan Mantri Fasal Bima Yojna (PMFBY)	Crop insurance scheme, replacing earlier two schemes, namely, National Agricultural Insurance Scheme (NAIS) and Modified National Agricultural Insurance Scheme (MNAIS).	To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crop as a result of natural calamities, pests and diseases. To stabilise the income of farmers to ensure their continuance in farming. To encourage farmers to adopt innovative and modern agricultural practices. To ensure flow of credit to the agriculture sector.	Insurance coverage of crops includes food crops (cereals, millets and pulses), oilseeds, annual commercial / annual horticultural crops. In addition, pilots for coverage can be taken for those perennial horticultural crops for which standard methodology for yield estimation is available. Risks leading to crop loss to be covered under the scheme are yield loss, prevented sowing, post-harvest losses, localised calamities, and losses to standing crops due to unpreventable risk.	2016 (the revamped scheme approved in 2020)	7.0 (State's share)	Central: 50% State: 50%
Pradhan Mantri Kisan Samman Nidhi Yojna (PM-KISAN)	Department of Revenue and Land Records is the nodal department of the scheme in HP (DoA as executive committee member)	To supplement the financial needs of all landholding farmers' families in procuring various inputs to ensure proper crop health and appropriate yields, commensurate with the anticipated farm income as well as for domestic needs.	Under the scheme, an amount of INR 6000/- per year is released by the central government online directly into the bank accounts of the eligible farmers under Direct Benefit Transfer mode, subject to certain exclusions.	2018		Central: 100%
Promotion of Farmers' Producer Organisation (FPO)	NABARD's Farm Sector Initiatives	To promote the establishment and nourishment of FPO to ensure better income for the producers through an organisation of their own.	NABARD has created its own fund for promotion and nurturing of FPOs throughout the country. In Himachal Pradesh, NABARD has sanctioned a grant for formation / promotion of 87 FPOs in Shimla, Mandi, Kinnaur, Sirmour, Chamba, Hamirpur, Bilaspur, Kullu and Solan districts.	2013	A grant of INR 8.5 crore for formation / promotion of 87 FPOs	
E-National Agriculture Market (E-NAM)		To facilitate farmers, traders, and buyers with online trading in commodities helping in better price discovery and providing facilities for smooth marketing with transparent financial transactions.	A huge agricultural market has been created by connecting various mandis of the country with e-portal. APMCs in the country are registered with e-portal. In HP 2 APMCs, 5 sub-yards, and 12 mandis are registered under this scheme and 59 commodities mainly fruits and vegetables are traded through E-NAM.	2016		

Source: JICA Study Team

3.1.2 Major State Policies and Schemes on Agriculture Sector

(1) State Policies Related to Agriculture Development

(a) Organic Farming Policy

The National Missions on Sustainable Agriculture emphasises the promotion of good agricultural practices as necessary components of the agriculture development approaches, for which organic farming is taken as the best-known tool. Recognising the importance of organic farming as a sustainable option for maintaining productivity of farm lands by reducing the use of chemical fertilisers and pesticides, as well as, reducing cost of cultivation and improved productive capacity, the state government developed the Organic Farming Policy. The strategies and activities to achieve this broad vision of organic farming include subsidies on organic inputs, capacity building through training, demonstration on farm trails on farmer fields, adoption of technologies for organic farming, strengthening organic extension support services and organic quality assurance, as well as, building organic supply chain and marketing.

(b) State Water Policy 2013

The State Water Policy 2013 comprehensively addresses water usage and distribution for diverse purposes including domestic, commercial, industrial, irrigation, hydropower generation, and recreation. The policy puts priority on water supply for irrigation following drinking water due to necessity of water resource development, watershed management, and improvement of water use efficiency in agriculture. It also indicates the need for covering 84,000 ha by irrigation schemes to improve productivity of the cultivable land and economic prosperity of agriculture through diversion of land to cultivation of vegetable, horticulture, and cash crops. Shift from flood irrigation and open channel irrigation to micro irrigation and piped supply is instructed in the policy.

(c) Sustainable Development Goals (SDGs) in Himachal Pradesh

The Government of Himachal Pradesh started the institutionalisation of SDGs in the state budget starting from the financial year 2016-17. The HP budget statement 2016-17 laid particular emphasis on the achievement of targets under the SDGs. Targets to be achieved by 2022 set by the state government as mentioned in the budget 2016-17 are:

- i. Percentage of people living below poverty line to decrease from 8.1% to 2%
- ii. Universal coverage of safe drinking water supply to all households
- iii. Additional 30,000 hectares of CCA will be created for irrigation
- iv. Motorable roads to connect all Panchayats
- v. One hundred percent electric connections for all domestic consumers
- vi. Infant mortality rate to decrease from 35 to 20 per 1000 live births
- vii. Number of females per 1000 males (age:0-6) to increase from 909 to 940
- viii. Enrolment ratios for boys and girls of all communities to be 100%
- ix. Enrolment ratios in colleges to increase from 29% to 36%
- x. Dropout rates to decline in elementary and secondary schools to 0.73 and 5.96, respectively

DoA was nominated as the nodal department of Goal 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

(2) Thrust Areas for Agriculture Development in HP

The thrust areas for future agriculture development in HP identified by DoA are as follows. It emphasises the need for the diversification of crops as the firstly mentioned thrust area.

- i. Diversification of area from traditional crops to commercial crops where irrigation potential has been created. The farmers shall be motivated to produce organic vegetables without the use of pesticides and chemical fertilisers.
- ii. Development of rainfed areas through watershed approach on a large scale for efficient use of natural resources. Increased funding shall be arranged under RIDF.

- iii. Promotion of rainwater harvesting, which will not only provide lifesaving irrigation to the crops but shall also recharge the groundwater and check erosion.
- iv. Increase in maize productivity through high yielding hybrids.
- v. Adoption of precision farming practices (polyhouse and micro irrigation).
- vi. Organic farming.
- vii. Post-harvest management and efficient marketing system.
- viii. Farm mechanisation with special reference to hill agriculture as a major thrust in the years to come, which is necessary to reduce cost of cultivation in view of high cost of labour.
- ix. A strong research extension interface directed towards problems-oriented research programmes.
- x. Extension reforms through public-private partnership.
- xi. Agro-processing and value addition.
- xii. Increase in productivity and quality.
- xiii. Application of biotechnology in the field of agriculture.
- xiv. Soil testing and Soil Health Cards.

(3) Schemes and Programmes on Agriculture and Allied Sectors

The State Government of HP has been operating several different schemes on agriculture and allied sectors, which include irrigation development, improvement of crop productivity, crop protection, insurance schemes, farm mechanisation, etc.

Regarding crop diversification, related schemes and programmes to diversify agricultural activities have also been initiated. The focus of the government is on promoting off-season vegetable production by switching from traditional crops to cash crops as a result of promotional programmes and schemes launched by the state government. The state government has started a scheme named 'Establishment of Centres of Excellence for Vegetable Nursery Production' to raise vegetables seedlings, flowers and other valuable plants by farmers under controlled environment. Centres of excellence for nursery production are established at Jubbarhatti of Shimla, Solan, and Mandi districts to provide better planting material to the farmers. For systematic diversification of crops, the DoA has taken up 'Seed Village Programme', 'Sub Mission on Seed and Planting Material' (SMSP) of National Mission on Agriculture Extension and Technology' (NMAET) for introduction of high yielding hybrids of vegetables, grafted vegetable seedlings, exotic vegetables, popularisation of micro irrigation system, protected cultivation and to encourage seed production. In order to further boost vegetable production and to achieve faster and more inclusive growth in the agriculture sector, the state government has also launched projects on production of vegetables under protected cultivation by supporting the development of polyhouses. The schemes that support polyhouse development include 'Dr.Y.S.Parmar Kisan Sawrozgar Yojna', 'Mukhya Mantri Nutan Polihouse Yojna' (MMNPY) under 'RIDF XXV', and 'Mukhya Mantri Green House Revolution Scheme' (MMGHRs).

With the purpose of providing adequate irrigation facilities to promote vegetable production in the state, the state government is implementing various irrigation programmes. Construction of check dams and ponds for irrigation purpose is supported through '*Jal se Krishi Ko Bal Yojna*'. Subsidies for construction of lift irrigation scheme and borewells are provided through 'Lift Irrigation and Borewell Scheme'. Assurances on installation of solar pump are covered in the scheme of 'Saur Sinchayee Yojna'. Sprinkler and drip irrigation systems are subsidised in the 'Rajiv Gandhi Micro-Irrigation Scheme' under RIDF funding. Flow irrigation, micro-irrigation and solar lift irrigation that are not approved under RKVY programme are funded through 'Flow Irrigation Scheme'. Funds from the central government scheme of '*Pradhan Manti Krishi Sinchayee Yojna*' are available for irrigation projects and watershed development.

'*Rajya Krishi Yantrikaran* Programme' was launched by the state government for farm mechanisation for the improvement of productivities and promotion of off-season vegetable cultivation. Nearly 15 crores of budget are provided for 'Sub Mission on Agriculture Mechanization' under 'National Mission on Agriculture Extension and Technology' (NMAET) for the year 2019-20.

The schemes and programmes implemented with state initiatives on agriculture and allied sector are summarised in the following table.

Table 3.1.2 Agriculture Related Schemes Sponsored by State Government

Name of Scheme	Positioning and Background	Aim of the Scheme	Assistance	Year Launched	Budget (INR in crore)
Rajya Krishi Yantrikaran Programme (RKYP)		Farm mechanisation for improvement of productivities and promotion of off-season vegetable cultivation	50% subsidy will be provided to the eligible beneficiaries belonging to small and marginal farmers, women, scheduled castes and scheduled tribes on purchasing of small tractors, power tillers, weeders and other need-based/ approved machineries	2018	20.00 (2019-20)
Prakritik Kheti Khushal Kisan Yojna	Under Zero Budget Natural Farming (ZBNF)	To bring down the cost of cultivation and enhance farm income by adoption of climate resilient Zero Budget Natural Farming practices	1. 80% assistance for lining of cattle sheds 2. 75% assistance for providing plastic drums to farmers. 3. 75% assistance for physical and biological pest control measures 4. Third party certification process for efficient marketing of ZBNF produce 5. One-time assistance of INR 50,000/ shop spread over three years for opening <i>Prakritik Kheti Sansadhan Bhandar</i> shops at the village level for supply of ZBNF inputs 6. Honorarium for resource persons and experts involved in capacity building and <i>kisan goshtis</i>		19.25 (2019-20)
Mukhya Mantri Khet Sansarkshan Yojna (MMKSY)		To protect standing crops from stray and wild animals and monkeys menace	80% subsidy for installing solar power fence around the farms, 50% for regular electric fencing system, 70% for composite fencing comprising of solar fencing integrated with G.I. wire mesh for individual or group of farmers.	2016	35.00 (2018-19) 45.00 (2019-20) 40.00 (2020-21)
Uttam Chara Utpadan Yojna		To increase fodder production by bringing an area of 25,000 ha under fodder production	Quality seed of fodder grasses, cuttings and seedlings of improved fodder varieties are supplied at subsidised rates to farmers.		5.60 (2020-21)
Mukhya Mantri Nutan Polyhouse Yojna (MMNPY)	Under RIDF-XXV	To achieve faster and more inclusive growth in agriculture sector	Assistance in construction of polyhouse, and installation of micro irrigation scheme, and undertaking extension activities like training and sensitization of farmers	2018	78.57 (2019-20)
Dr.Y.S.Parmar Kisan Sawrozgar Yojna		To achieve high productivity, quality, safeguard against adverse weather, efficient input use	Support on polyhouse and micro irrigation development (sprinkler, drip system, pumping machinery). 85% assistance for polyhouse with micro irrigation, and 50% subsidy for pumping machinery	2014	
Mukhya Mantri Green House Renovation Scheme (MMGHR)			Replacement of polysheet of 5-year old polyhouses or polysheet of polyhouses damaged due to natural calamities with assistance of 70% of the cost. Beneficiaries are individual farmers engaged in vegetable/vegetable nursery production for the last five years or more with an experience in protected cultivation.	2017 (extended to DoH in 2018)	3.0 (2017-18)

Name of Scheme	Positioning and Background	Aim of the Scheme	Assistance	Year Launched	Budget (INR in crore)
Rajiv Gandhi Micro-Irrigation Scheme (Efficient Irrigation through Micro-irrigation Scheme)	Project is under appraisal with NABARD under RIDF-XXI funding for 4 years (2015-18) extended up to 2021	To promote agriculture by increasing productivity by developing micro-irrigation system	Support with subsidy for installation of sprinkler and drip irrigation system (80% for micro irrigation, 50% for shallow wells, shallow bore wells, 50% for lifting water with electric motor, 50% for pumping machinery).	2015	15.10 (2018-19) 24.10 (2019-20) 30.00 (2020-21)
Saur Sinchayee Yojna	Operated in convergence with other schemes such as sub-component of "Per Drop More Crop" component of central scheme of PMKSY, Sub Mission for Agricultural Mechanisation, minor irrigation scheme under RIDF, and PM-KUSUM	To provide assured irrigation to crops, enhance the production and productivity where electricity accessibility in remote area is costly	90% assistance to small/marginal farmers for the installation of solar pumping machinery on individual basis, while 80% to medium and big farmers, and 100% to a group of farmers of small and marginal category/Kisan Vikas Sanghs/Krishak Vikas Sangh/registered body of farmers.	2018	25.00 (2019-20) (Fund is allocated from central scheme of PM-KUSUM for 2020-21)
Jal Se Krishi Ko Bal Yojna		To provide water for irrigation	Support on construction of check dams and ponds for irrigation purpose on community basis, and on small lifting schemes or flow irrigation schemes on individual basis. Financial assistance of 100% expenditure on community-based small water saving scheme.	2018	25.00 (2019-20, 2020-21) (Total budget of 250 crore for 5 years)
Lift Irrigation and Borewell Scheme	A consecutive scheme of 'Subsidy on Lift Irrigation Scheme and Bore wells'	To increase irrigation potential in the state	50% subsidy for construction of lift irrigation scheme and installation of borewells by individual or group of farmers. Financial assistance for construction of low and medium lift irrigation systems, shallow wells, shallow bore wells, water storage tanks, pumping machinery and water conveyance pipes.	2018	9.91 (2019-20) 10.00 (2020-21)
Flow Irrigation Scheme	Covering flow irrigation, micro-irrigation and solar lift irrigation that are not approved under the central scheme of RKVY	To bring more areas under assured irrigation in the next five years	Interventions to be undertaken: - Remodeling of old small irrigation schemes lying defunct - New flow irrigation schemes on community basis - Community micro-irrigation schemes - Strengthening distribution system for command area - Shallow well and borewell on individual basis Financial assistance of 100% for above mentioned community schemes, 50% for individual or farming groups for construction of shallow wells and borewells	2018	25.00 (2018-19, 2019-20) 15.00 (2020-21)

Source: JICA Survey Team

(4) Other Programmes Implemented under DoA

DoA operates the following programmes continuously apart from the abovementioned schemes. Targets of each programme are set in each cultivation season.

- i) Fertilizer Consumption and Subsidy: distribution of chemical fertiliser and bio-fertilisers to secure crop yield, and popularisation of balanced use of fertiliser amongst the farming community, as well as education of farmers on use of bio-fertiliser, organic manure and compost to promote organic farming.
- ii) High Yielding Varieties (HYV) Programme: distribution of HYV/hybrid quality seeds of paddy, maize, pulses, and oil seeds.
- iii) Plant Protection Programme: distribution of pesticide and plant protection materials to control insect/pest/diseases/weeds, and promotion of natural farming techniques as plant protection measures.
- iv) Improved Farm Implements/Machinery: distribution of improved farm implements/machinery.
- v) Quality Control: analysis and investigation of samples of soil, fertiliser, pesticide, and seeds and issuing soil health card.
- vi) Marketing: through State Agricultural Marketing Board and market committees. The work of development of marketing infrastructure is done out of the funds of APMCs.

3.1.3 Ongoing Externally Aided Project

Currently, there are two externally aided projects related to agriculture and allied sectors as follows: Both projects focus on horticulture, one of which specially targets fruits crops. Government of HP seeks to bring project directors of all externally aided projects together on a single platform to share project activities with others and create synergies between projects. This concept has just begun and will be institutionalized in the future.

(1) Himachal Pradesh Horticulture Development Project (HPHDP)

(a) Overview of the Project

HPHDP was commenced in 2016 as a World Bank-funded project. The development objective of the concerned project is to support small farmers and agro-entrepreneurs to increase the productivity, quality, and market access of selected horticulture commodities in Himachal Pradesh. The project beneficiaries include farmers and entrepreneurs in the Micro, Small and Medium Enterprises (MSME) segment, Farmer Producer Organisations (FPOs) and other value chain participants, prioritising small and marginal producers with specific focus on fruit-bearing tree crops. Even though the project targets the whole state, major proportion of the interventions are to be provided in Shimla, Kullu, Kinnaur, Chamba, and Mandi districts due to the existing production potential. The total project cost for the project period of seven years is USD 171.5 million.

Main project components are:

- Component A: Horticulture production and diversification (support on access to knowledge, technology and finance)
- Component B: Value addition and agro-enterprise development (fostering market linkage in the value chain and secondary and tertiary processing for value addition, and support supply chain infrastructure)
- Component C: Market development (providing platform for market-related information and intelligence, expanding market access, enhancing transparency in the price discovery process and improving market infrastructure)
- Component D: Project management, monitoring and learning

The project supports to increase fruit production and productivity through intensification, crop diversification among fruits and varieties, expansion of area under horticultural crops, and improving processing infrastructure and market linkage. Development of minor community irrigation system (19,500 ha for 1000 water users associations) is also targeted.

(b) Progress of the Project

Within the abovementioned project components, the project has been carrying out activities such as formation of FPOs, upgrading and establishment of market facilities, formation of the WUAs for the developed minor irrigation schemes. The latest progresses of the activities related to HPCDP II are summarised in the following table.

Table 3.1.3 Process and Progress of Activities in HPHDP I

Activity	Process and Progress
Mobilisation and empowerment of FPOs	The process of formation of 30 FPOs and establishment of corresponding number of Common Service Centres commenced from August 2019. Formation of CIGs/FIGs, capacity building of CIGs/ FIGs, federation of CIGs/ FIGs into Farmer Producer Companies (FPCs), establishment of Common Service Centres, development of sustainable forward and backward linkages of FPCs, networking with research and financial institutions and overall handholding in developing FPCs into self-sustainable business entity etc. are going on and will be accomplished by April, 2022
Upgrading and Modernizing of 16 APMC	Nine projects, instead of 16, are being undertaken, out of which, 3 are green field project where new auction yards and shops are to be developed. APMCs upgraded are Kangani Market Yard, in Mandi, Poanta Market Yard in Sirmour, Palampur Market Yard in Kangra, Shatt Market Yard, in Kangra, Parwanoo Market Yard in Solan, Parala Market Yard in Shimla. New market yards are established at Mahandli in Shimla, Bandrol in Kullu, Shilaroo in Shimla.
Upgrading and modernizing of HPMC's supply chain infrastructure	Six packing grading houses are being upgraded and 4 new packing grading houses are being established, which are mainly for apple production. Three CA storages are being upgraded and 3 new CA storage are being established.
Improved market related information and intelligence mechanism	Market information mechanism is being improved by dissemination of target information through ICT in partnership with the existing private players. Market intelligence is improved through preparation and dissemination of commodity outlook reports, and creation of database of buyers, traders, agribusiness and transporters. All the commodities being presently handled by APMC are included in these mechanism
Formation of WUAs for developed minor irrigation scheme	WUAs are formed for the developed minor irrigation schemes and are registered under the Himachal Pradesh Societies Registration Act 2006.

Source: Questionnaire response from HPHDP I

(c) Possibility of Coordination with HPCDP II

Although HPHDP does not handle vegetables directly in its activities, some activities which are closely related to HPCDP II. Since improvement of market related information and intelligence mechanism, which is one of the important factors in the HPCDP II, is fundamentally covered in HPHDP, the mechanism established in HPHDP shall be adopted in HPCDP II. Promotion of agri-enterprises and development of market are common objectives in both HPHDP and HPCDP II even though targeting produces might be different. Therefore, strategies and lessons learnt through the experiences of HPHDP on the activities including market development and FPO formation shall be applied in HPCDP II. Moreover, collaboration and referral to the HPHDP shall be necessary where horticulture production is operated within the target CCA of HPCDP II.

(2) Himachal Pradesh Subtropical Horticulture, Irrigation and Value Addition Project (HP SHIVA)

(a) Overview of the Project

The State Government of HP requested the Asian Development Bank (ADB) assistance for the Himachal Pradesh Subtropical Horticulture, Irrigation and Value Addition Project (HP SHIVA) to support the development of horticulture in subtropical areas of the state, and to reduce income gap between farmers in subtropical and temperate horticulture regions. The project status is under proposed with recent completion of concept clearance.

The project aims to increase the income of at least 25,000 farm households in the seven districts of Bilaspur, Hamirpur, Kangra, Mandi, Solan, Sirmour, and Una. 28 priority blocks in the seven districts in the subtropical low hills zone and some in the mid hills sub-humid zone of the state are targeted. The project will expand irrigated area and its sustainable operation, increase subtropical horticulture production and its climate resilience, and assure profitability of subtropical horticulture production through value chain development of targeted commodities.

The project's primary beneficiaries are rural households living in the seven targeted districts and other related private sector stakeholders. State departments of horticulture and irrigation will participate in the project as implementing agencies, in which Horticulture Department will play the role of nodal department. The project will directly support innovative value chain development that actively engages farmer horticulture producer groups.

Interventions include improvement of irrigation facilities, support in forming WUAs or strengthening existing WUAs, horticulture crop inputs, establishing horticulture farmer groups as well as farmer producer organisations, developing innovative value chain, promoting value addition activities in horticulture value chains, and other value-added income generating activities.

(b) Possibility of Coordination with HPCDP II

Since the project is still under preparation of Project Readiness Financing (PRF), which will be implemented from December 2020 to December 2022, collaboration with this project and synergy effect of these two projects can be considered throughout the project implementation. Even though target produces differ, objectives and approaches to be taken for each respective production such as way of irrigation infrastructure development, establishment and strengthening of KVA and FPO and value chain improvement and value addition on agriculture produce are interrelated between HPSHIVA and HPCDP II. Therefore, established system, facilities, models etc in one project shall be applied in the other. Lessons should be also shared between the projects through close communication. Coordination between the projects as well as with the nodal departments will be necessary on the common issues between horticultural products and agriculture products such as marketing facility development. Since the HPSHIVA includes preparation of ten-year investment plan for DoH in its project scope, outputs and experiences of the HPCDP II shall be promoted to be applied in the plan.

3.1.4 Financial Status of Agriculture Sector in the State

(1) State Budget for Agriculture Sector

The Finance Department of HP has issued the budget of 2020-21 as mentioned in the following table. Revenue expenditure for agriculture sector has been growing in actual amount although the percentage share of the agriculture sector in the total state budget declined from 5.54% to 4.65% between 2018 and 2020, which is the largest decline among the sectors.

Table 3.1.4 Revenue Expenditure of HP 2018-19 to 2020-2021

(INR in Crore)

Head of Account	2018-19 (Actual)	2019-20 (Revised Budget)	2020-21 (Budget)
1. General Service	11,438.76	14,441.40	15,527.92
2. Social Services	11,482.20	14,219.31	15,220.21
(a) Education, sports, art and culture	5,870.82	7,249.17	7,963.37
(b) Health and family welfare	1,892.29	2,515.25	2,746.09
(c) Water supply and sanitation	1,141.35	1,139.51	1,266.00
(d) Housing and urban development	575.64	615.31	805.97
(e) Social welfare service	1,417.16	1,811.44	1,900.29
(f) Others	584.94	888.63	538.49
3. Economic Services	6,498.27	7,665.63	8,364.09
(a) Co-operation	47.89	37.36	39.19
(b) Agriculture	1,629.62	1,783.44	1,820.33
(c) Forest	507.70	637.69	823.90

(d) Rural development	1,176.89	1,445.78	1,731.87
(e) Irrigation and flood control	420.77	486.45	543.20
(f) Industry and minerals	114.89	208.50	251.11
(g) Transport and tourism	1,932.55	2,423.63	2,539.75
(h) Others	667.96	642.78	614.74
4. Grant and Contributions	9.39	10.28	10.63
Net Revenue Expenditure	29,428.62	36,336.62	39,122.85

Source: Finance Department, Government of HP

Examining the financial situation of the Agriculture and Allied Activities (including agriculture, co-operation, and forest) for year 2020-21, nearly 30% of the budget is allocated for crop husbandry, followed by forestry and wildlife. Regarding irrigation and flood control, more than 90% of the revenue is to be spent for minor irrigation. Ratios of expenditure in agriculture and related sectors are shown in table below.

Table 3.1.5 Expenditures of Agriculture Related Activities in HP in Year 2020-2021

Major Head	Net Expenditure (INR In Lakhs)	Percentage Share
1. Agriculture and Allied Activities	268,342.11	100%
Crop husbandry	80,096.31	29.8%
Soil and water conservation	8,853.65	3.3%
Animal husbandry	43,689.98	16.3%
Dairy development	2,465.45	0.9%
Fisheries	3,143.50	1.2%
Forestry and wildlife	73,354.09	27.3%
Plantations	182.16	0.1%
Food storage and warehouse	30,507.73	11.4%
Agriculture research and education	21,130.01	7.9%
Co-operation	3,919.22	1.5%
Other agricultural programmes	1,000.01	0.4%
2. Irrigation and Flood Control	54,319.94	100%
Major irrigation	1,360.61	2.5%
Medium irrigation	1,433.70	2.6%
Minor irrigation	50,901.94	93.7%
Flood control and drainage	623.69	1.1%

Source: Prepared by the JICA Study Team based on the information from 'Explanatory Memorandum Budget 2020-2021' Finance Department of HP

(2) Budget of DoA

Within the abovementioned state budget, fund allocated to the DoA, the nodal department of the project is shown in the below table.

Table 3.1.6 Budget of DoA HP

(Unit: INR In Lakh)

Description	2017-18	2018-19	2019-20
Public Works	0	0	0
Housing	10	11	12
Crop Husbandry			
Direction & Admn.	3,329	2,864	2,968
Seeds	1,539	1,385	1,363
Agriculture Farms	3,000	2,474	3,303
Manurers & Fertilizers	993	2,720	2,003
Plant Protection	28	26	20

Commercial Crops	98	103	38
Extension & Farmers Training	4,086	5,170	8,061
Crop Insurance	600	500	461
Agr. Economics & Statistics	209	201	187
Agriculture Engineering	112	2,143	2,092
Scheme of Small/Marginal Farmers & Agr. Labour	40	40	26
Sch. Caste Sub Plan	4,480	4,924	4,454
Tribal Area Sub Plan	1,327	1,682	1,781
Other Expenditure	7,670	14,297	11,304
Sub-Total	27,514	38,544	38,064
Soil & Water Conservation			
Soil Survey & Testing	231	285	256
Soil Conservation	2,163	2,495	2,395
Sch. Caste Sub Plan	703	784	844
Tribal Area Sub Plan	754	726	802
Other Expenditure	1,705	2,238	2,252
Sub-Total	5,557	6,530	6,551
Fodder & Feed Dev.	700	800	857
Plantations (Tea)	149	137	132
Agr. Research & Education	13,006	11,500	13,000
Other Agricultural Programme	1,000	1,500	1,500
New & Renewable Energy	484	464	473
Capital Outlay on Crop Husbandry			
Seeds	3,807	3,997	3,997
Mannure & Fertilizers	16	17	17
Plant Protection	217	228	228
Agriculture Engineering	251	263	263
Sch. Caste Sub Plan	42	0	0
Tribal Area Sub Plan	0	0	0
Other Expenditure (Building)	158	390	1,040
Sub Total	4,492	4,896	5,546
Capital Outlay on Soil & Water Conservation			
Soil Conservation	1,835	2,790	2,340
Sch. Caste Sub Plan	1,008	1,227	1,086
Tribal Area Sub Plan	60	80	100
Sub Total	2,903	4,097	3,526
Grand Total D-11,15,31,32	55,809	68,470	69,651

Source: DoA, October 2020

While overall budget has been increasing, budget for some categories such as seeds, plant protection, commercial crops, crop insurance, agr. economics & statistics have been reduced. A remarkable fall of the budget for commercial crop should be notified.

(3) Budget of HPSAMB

Since HPSAMB has income sources apart from government budget, those incomes are crucial for sustainability and development of the HPSAMB. Income of the its own income sources have been increasing although the total income fluctuates depending on the government aid. According to the data in the below table, financial status of HPSAMB can be considered as sound.

Table 3.1.7 Budget Proposal of HPSAMB

(Unit: INR In Lakh)

S. No.	Name of Head (Income)	FY 2017-18	FY 2018-19	FY 2019-20
1	Receipts from Market Committees (25% Share of Market Fees, Recovery from Advances from employees, Interest and Other Receipts)	1,452	1,553	1,970
2	Receipt from Govt.(Grant in Aid from Centre and State Govt.)	1,000	0	170
3	Income from Capital Receipts	45,34	3,208	4,525
	Total	6,987	4,761	6,666
S. No.	Name of Head (Expenditure)	FY 2017-18	FY 2018-19	FY 2019-20
1	Expenses on Board of Director's	26	20	21
2	Expenses on Staff(Salary Wages etc)	382	347	362
3	Recurring Expenses(Office Expenses, Electricity Charges, Water Charges, Postage, Books, Motor Vehicle Etc.)	49	72	69
4	Non Recurring Capital Expenditure(Furniture & Fixture, P/M Computer Etc)	22	8	13
5	Loan and Advances to the Employees	10	5	5
6	Development Activities Expenditure on Market Information Research and Development. (Staff Training, Study Tour, Advertisement etc)	602	210	792
7	Capital Expenditure (Civil Works of Board,Tender Notice Advt., C/O CA & CS Store, C/O Kisan Bhawan	71	36	134
8	Deposit Work Expenditure of APMC's.	4,043	3,070	2,980
	Total	5,206	3,770	4,378

Source: HPSAMB, October 2020

(4) Budget of DoH

The budget provision for the year 2019-20 of Department of Horticulture is summarized as follows. The total budget for DoH per annum is 48,726 Lakh which is two third of the DoA budget.

Table 3.1.7 Budget Provision for the year 2019-20 of DoH

(Unit: INR In Lakh)

S.No.	Head	Plan	Non-plan	Total
(i)	Crop Husbandry			
1.	2059-Maintenance & repair of office building		9	9
2.	2216-Maintenance & repair of residential building		5	5
3.	01-Direction and Administration	0	1,277	1,277
4.	02-District Subordinate Staff		3,180	3,180
5.	04- Plant Protection Scheme	11	875	887
6.	05-Horticultural Development Scheme	187	1,689	1,876
7.	06-Fruit Plant Nutrition Scheme	17	139	156
8.	09-Development of Apiculture	34	348	383
9.	10-Development of Floriculture	36	148	185
10.	11-Estd. of Govt. Orchards & Nurseries	67	980	1,048
11.	15-Dev. of Mushroom Cultivation	68	310	378
	18-Training of farmers	30	-	30
12.	19-Taining and Extension Scheme	38	3,153	3,191
13.	22-Marketing and Quality Control	-	73	73
14.	26-Fruit Canning Units	89	735	824
15.	35-Hort. Eco and Stat	12	0	12
16.	50-Rashtriya Krishi Vikas Yojna	450	-	450
17.	51-Weather based Crop Insurance on Apple and Mango	2,500	-	2,500
18.	56-Mission for Integrated Dev. of Horticulture	2,077	-	2,077
19.	57-Hort. Dev. Project (World Bank)	12,000	-	12,000
20.	60-Import of Good Quality Root Stock	-	0	0
21.	61-Training to youth in pruning, chip budding and spray	-	0	0

22.	62-Pradhan Mantri Krishi Sinchayee Yojna (PMKSY)	1,067	-	1,067
23.	63-Mukhya Mantri Kiwi Protsahan Yojna	-	0	0
24.	64-Subsidy on Plastic Crates	-	200	200
25.	65-Nursery Promotion Scheme	-	0	0
26.	66-Jal Se Krishi Ko Bal Yojna	-	0	0
27.	67-Flow Irrigation Scheme	-	0	0
28.	68-Sour Sinchayee Yojna	-	0	0
29.	69-Mukhya Mantri Green House Renovation Scheme	-	100	100
30.	70-Prakritik Kheti Khushaal Kissan	-	1	1
31.	71-Bagwani Suraksha Yojna	-	1	1
32.	72- Himachal Pushp Krinti Yojna	-	1,000	1,000
33.	73-Mukhya Mantri Madhu Vikas Yojna	-	500	500
34.	74-Subsidy on Anti Hail Net	-	2,000	2,000
35.	75-Mukhya Mantri Khumb Vikas Yojna	-	500	500
36.	2415-Research and Education	9,000	-	9,000
37.	4401-Capital outlay	575	1,293	1,868
38.	4402-Capital outlays on soil and water conservation		0	0
39.	6401-190-02		0	0
	Total (i)	28263	18,522	46,786
(ii)	22-Marketing and Quality Control			0
	General Marketing	3	-	3
	MIS/Support Price	1,644	-	1,644
	Total (ii)	1,647	0	1,647
(iii)	SCA to TASP / SCA to OTA / SCA to SCSP	262	-	262
(iv)	Horticulture Economics and Stat. (CSS)	31	-	31
	Grand Total (i+ii+iii+iv)	30,204	18,522	48,726

Source: <http://www.hpagnisnet.gov.in/hpagnis/Horticulture/PDF/budget%202019-20.pdf>, DoH, HP

3.1.5 Post COVID-19 Policy

(1) Current Situation on COVID-19

The Indian government ordered curfew and lockdown due to the containment and spread of Novel Corona Virus since March 24, 2020. All JICA TCP Experts left for Japan on March 21, 2020, according to the instruction of JICA. Currently, there are no Japanese experts in the field.

As of May 31, 2020, intra- and inter-state movements are prohibited; further curfew is also applied. So far, the following orders were issued for the containment and spread of COVID-19:

Table 3.1.8 List of Orders Regarding COVID-19 in Himachal Pradesh

Date	Authority	Order for Curfew and Lockdown
March 24	India	Containment measures to be continued for 21 days w.e.f. 25.03.2020 (from 25.03 to 14.04) (Lockdown 1.0)
April 14	India / HP	Containment measures to be continued from 15.04 to 03.05.2020 (Lockdown 2.0)
May 1	India	Containment measures to be continued from 04.05 to 17.05.2020 (Lockdown 3.0)
May 17	India / HP	Lockdown to be continued from 18.05 to 31.05.2020 (Lockdown 4.0)
May 30	India	Lockdown to be continued from 1.06 to 30.06.2020 for containment zones (Lockdown 5.0) Reopening in three phases is announced in areas outside containment zones. (Unlock 1)
May 31	HP	All offices under the government of HP shall remain open on all working days with 100% attendance of all officers/officials.
June 29	India	(Unlock 2) -There shall be no restriction on inter-state and intra-state movement of persons and goods.
July 29	India	(Unlock 3)

		-Restrictions on movement of individuals during night (night curfew) have been removed. -It has been decided that schools, colleges and coaching institutions will remain closed till August 31, 2020. -Standard SOP was supplied as Annexure-1.
August 31	India	(Unlock 4) - Lockdown period in containment zone was extended up to September 30, 2020. - All inter-state movements to the state will be monitored through registration in COVID E-Pass software. - Congregations with a ceiling of 100 persons permitted from Sep. 21, 2020.

Source: HP Government and Central Government, as of August 31, 2020

According to the order issued on May 31, 2020, the situation in H.P. has been improved since June 2020. All offices under the Government of HP shall remain open on all working days with 100% attendance of all officers/officials. Further, it was recommended that there shall be no restriction on inter-state and intra-state movement of persons and goods, according to the order issued on June 29, 2020.

On July 29, 2020, the Unlock 3 Guidelines was issued by MHA, GOI. It is advised that restrictions on the movement of individuals during night (night curfew) have been removed. However, it has been decided that schools, colleges and coaching institutions will remain closed till August 31, 2020.

However, the lockdown period in containment zone was extended up to September 30, 2020, applying Unlock 4. Further, it is proposed that inter-state movement would be monitored through registration in COVID E-Pass software since September 1, 2020.

The current situation of the spread of COVID-19 in the State of Himachal Pradesh is shown as follows:

Table 3.1.9 Outbreak in State of Himachal Pradesh

(Unit: persons)

District	Confirmed	Active	Recovered	Deceased
Hamirpur	567	120	442	5
Kangra	860	220	631	9
Una	487	158	326	1
Chamba	431	88	338	4
Solan	1451	367	1042	6
Bilaspur	323	108	215	0
Mandi	400	32	361	7
Shimla	338	91	243	3
Sirmaur	887	306	579	2
Kullu	283	51	231	0
Kinnaur	81	23	58	0
Lahaul and Spiti	8	1	7	0
Total in H.P	6,116	1,562	4,473	37
Total in India	3,687,940	784,541	2,837,377	65,433

Remark: as of August 31, 2020

Source: www.covid19india.org

Further, the current situation of social and agricultural activities in HP is summarized in the following Table 3.1.10:

Table 3.1.10 Current Situation and Constraints under COVID-19 in Himachal Pradesh

DDA/ SAMETI	Activities of Palampur University and KVKs	Extension Activities in Fields / Villages	Operation Hour of Wholesale Market and Retail shops	Constraints on Shipping and Selling Agricultural Products
<u>DDA</u> Office works following COVID guidelines are going smoothly during all working days. Monthly/ periodical	Scientists in-charge are visiting their field trials in the university / KVK farms, no extension	EOs are visiting farmers' fields for monitoring / surveillance of pests (flag army worm/	6:00 am to 7:00 pm (But the traders associations are closing the retail shops earlier, may	No restrictions on shipping of farm produce within and outside the states. Goods vehicles are

meetings are being arranged in small groups. Feedback at the district level is also taken using WhatsApp / phone calls. Input supply (seed / agro-chemicals/ fertiliser / farm machines) is normal. <u>SAMETI:</u> No training as SAMETI Hostel has been taken over by the state government as Covid-19 Care Centre.	(training of farmers / EOs) or teaching work .	locust) and guiding the farmers (in small group) about the preventive measures. No farmers trainings / exhibition / farmers fair / women fairs are being arranged.	be at 3:00 pm to 7:00 pm due to COVID-19 fear; and smaller number of customers in the market). Every Sunday, Hamirpur and Bilaspur markets are closed (except for barber / meat and milk products shops)	plying normally without any restrictions (outside containment areas).
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Remark: as of August 31, 2020
Source: Interview with DoA

(2) Issues against COVID-19 and Countermeasures

There is no specific SOP that has been issued by DoA. Generally, DoA arranges its activities, following social distancing, bearing mask, using sanitisation, according to the guidelines issued by the GoI². Further countermeasures in extension and training activities are as follows:

(a) Restriction on Large Public Gatherings

Containment area has been broadly squeezed since June 2020, while large public gathering continues to remain prohibited (basically less than 20 persons). Namely, it is restricted to arrange training of extension officers / farmers, meeting, and workshop in large number. It is predicted that this situation would be continued for the time being. Therefore, it is required to arrange meeting as well as workshop on a smaller scale. Meanwhile, group work should be avoided.

(b) Restriction of Training Programmes for Extension Officers in Institutes Concerned

It is recommended that schools, colleges, SAMETI, and Farmers Training Centre (FTC) should remain closed for the time being. Therefore, there are no training programmes in the institutes concerned.

3.2 Administrative Set-up and Other Related Organization for Agriculture Development

3.2.1 Department of Agriculture (DoA)

(1) Mandates of the Department of Agriculture

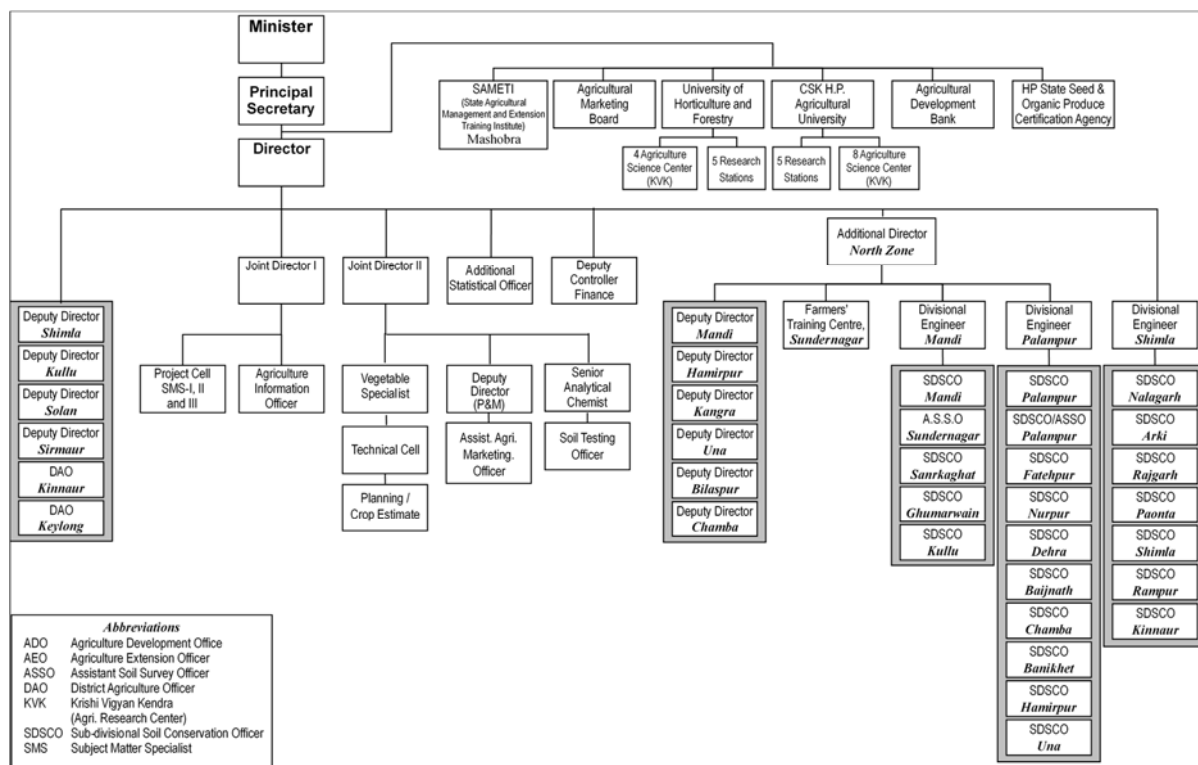
The Department of Agriculture (DoA) is mainly involved to serve the farming community by implementing various developmental programmes and disseminating the relevant technology to increase productivity and production of field crops and other commercial crops. The major mandates of DoA are as follows:

- i) To provide farm advisory services and extension support for adoption of new farm technology for increasing agriculture production so that the economy of the farmers is improved.
- ii) To provide logistic support to the farmers in the form of supply of inputs like seeds, fertilisers, plant protection material, implements, etc.
- iii) To harness the agro-ecological potential through adoption and production of cash crops.
- iv) To undertake soil and water conservation measures on agriculture lands and to create need-based infrastructure like irrigation and encourage diversification towards the production of cash crops.
- v) To provide agriculture marketing services to the farmers.

² The latest guidelines are attached as Annexure-1 in the notification of Unlock 4 issued on July 29, 2020.

(2) Administrative Set-up

The organizational structure of DoA is shown in Figure 3.2.1. Whilst the Minister and the Principal Secretary of Agriculture are the policy making authorities in the state, the DoA is headed by the Director of Agriculture with headquarters at Shimla. The Director of Agriculture is assisted by the Additional Director of Agriculture, two Joint Directors of Agriculture at the headquarters. One Additional Director of Agriculture has been posted in the North Zone at Dharamshala, District Kangra, who is monitoring all the activities in Kangra, Chamba, Una, Hamirpur and Mandi districts as well as the activities under soil and water conservation.



Source : DoA

Figure 3.2.1 Organization Structure of Department of Agriculture, State of Himachal Pradesh

In each district (except Lahaul and Spiti and Kinnaur), the Deputy Director of Agriculture is responsible for implementation of all agriculture development programmes in the districts. In Lahaul, District Agricultural Officer at Keylong, in Spiti Division, Assistant Project Officer (Agr.) at Kaza and in Kinnaur District, District Agricultural Officer at Reckong Peo are responsible for the implementation of agriculture development programmes. The Deputy Director of Agriculture in the district is assisted by the District Agricultural Officer, Regional Potato Development Officer in three districts, and Soil Testing Officer. With a view to strengthen the extension network at grass roots level, one Subject Matter Specialist (SMS), two Agriculture Development Officers (ADOs), and 4 to 6 Agriculture Extension Officers (AEOs) are working in each development block. For soil and water conservation activities, 21 sub-divisions are in existence and each sub-division is headed by the Sub Divisional Soil Conservation Officer. These sub-divisions are under the control of three divisions with Divisional Headquarters at Shimla, Bhangrotu, and Palampur. However, their administrative and financial control is with the Deputy Director of Agriculture of the district concerned. In addition to this, 12 Project Directors, under ATMA scheme, are also working in the respective district.

The number of extension officers in the DoA (as of August 2020) is shown below.

Table 3.2.1 Extension Officers in DoA (As of July 2020)

Position	Sanctioned Posts	Presently Filled-up Posts	Vacant Posts
Director	1	1	-
Additional Director	2	1	1
Joint Director	2	6	-

Deputy Director	19	16	3
DAO/APO	13	9	4 (3DAO, 1 APO)
SMS	117	112	5
ADO	328	155	173
AADO	60	55	5
AEO	700	426	274
Total	1242	781 (4 excess)	465

Note : The sanctioned posts are specified based on state ordinance
Source: DoA

Table 3.2.2 Technical Staffs in DDA and PD ATMA Offices of 12 Districts

(1) Technical Staffs in DDA and PD ATMA Offices												
District	DDA Office						ATMA Office					Total
	DDA	SMS	ADO	AADO	AEO	Sub-total	PD	DPD	SMS	AEO	Sub-total	
Bilaspur	1	3	10	-	2	16	1	1	1	-	3	19
Chamba	1	4	14	-	1	20	1	1	1	-	3	23
Hamirpur	1	3	10	-	1	15	1	1	1	-	3	18
Kangra	1	8	40	-	3	52	1	1	1	-	3	55
Kinnaur	-	-	4	-	1	5	1	1	1	-	3	8
Kullu	1	4	7	-	2	14	1	-	1	-	2	16
L&S	-	1	4	-	1	6	-	1	1	-	2	8
Mandi	1	6	30	-	3	40	1	-	1	-	2	42
Shimla	1	5	12	-	2	20	-	1	1	-	2	22
Sirmaour	1	4	9	-	1	15	-	1	-	-	1	16
Solan	1	4	7	-	2	14	1	1	1	-	3	17
Una	1	3	8	-	-	12	1	-	1	-	2	14
Total	10	45	155	-	19	229	9	9	11	-	29	258

(2) Block Level Extension Officers										
District	Number of Blocks	No. of AEO Circles	Block Level Extension Officers							Total
			SMS	ADO	AADO	AEO	BTM	ATM		
Bilaspur	4	20	3	4	3	23	4	18	55	
Chamba	7	39	5	6	3	12	7	13	46	
Hamirpur	6	42	7	5	6	23	5	11	57	
Kangra	15	95	15	17	11	62	14	25	144	
Kinnaur	3	9	-	1	-	4	2	6	13	
Kullu	5	27	5	2	4	20	5	10	46	
L&S	2	7	-	1	-	2	2	4	9	
Mandi	10	71	10	12	9	62	11	21	125	
Shimla	10	49	8	4	7	22	11	20	72	
Sirmaour	6	42	5	3	3	20	5	12	48	
Solan	5	35	5	4	4	18	5	10	46	
Una	5	35	4	5	3	14	4	9	39	
Total	78	471	67	64	53	282	75	159	700	

Source: DoA

Table 3.2.3 Basic Features of Extension Officers in SMS Offices (SMS / ADO / AADO / AEO)

District	Gender		Experience (year)				Education			
	Male	Female	10 or less	11 to 20	21 to 30	31 and over	Diploma	Bachler	Master	Ph D
Bilaspur	32	-	9	13	10	-	8	19	5	-
Chamba	30	3	10	5	8	-	3	13	7	-
Hamirpur	35	4	13	13	13	-	10	21	7	1
Kangra	68	30	50	18	26	4	28	39	31	-

Kinnaur	3	1	3	1	-	-	1	2	1	-
Kullu	25	3	9	13	5	1	5	17	6	-
L&S	7	-	5	2	-	-	1	3	3	-
Mandi	86	3	14	55	20	-	16	40	29	4
Shimla	35	3	15	10	13	-	9	21	8	-
Sirmaour	23	8	19	3	9	-	5	14	12	-
Solan	27	2	7	14	8	-	8	14	7	-
Una	22	5	8	11	7	1	8	13	6	-
Total	393	62	162	158	119	6	102	216	122	5

Source: DoA

(3) Activities of the DoA

The activities of the DoA can be broadly classified as mentioned below.

Table 3.2.4 Activities of the Department of Agriculture

Extension Activities	Quality Control Activities	Developmental Activities	
		Input Management	Soil and Water Conservation Activities
<ul style="list-style-type: none"> • Production technology • Protection technology • Post-harvest and marketing management • Pest management for Cereals Vegetables Pulses Oil seeds Tea 	<ul style="list-style-type: none"> • Pesticide control laboratory (Shimla) • Fertiliser and quality control laboratories (Sundernagar, Hamirpur) and fertiliser inspections • Seed testing laboratory • Bio-control laboratory (Palampur) 	<ul style="list-style-type: none"> • Distribution of seeds fertilisers, and pesticides • Assisting the farmers to obtain the inputs with subsidies. 	<ul style="list-style-type: none"> • Construction of water harvesting structures including check dams • Green houses • Sprinkler, drip and flow irrigation schemes

Source: DoA

(4) Central Government Initiatives

The schemes conducted under the central government initiatives are shown as follows:

Table 3.2.5 Schemes Conducted under the Central Government Initiatives

No.	Name of Scheme	Components	Remarks	Reference
1	National food security mission (NFSM) - Maize	Seeds on subsidy	Mobilisation of farmers for purchase of seed, agro-chemicals, equipment under subsidy from agri input stores	
	National food security mission - Wheat	i. Demonstration	Cropping system-based demonstration	Farming practices on the basis of PoP / own experience of EO
		ii. Farmers Training	Cropping system-based training / awareness.	-do-
		iii. Agri. inputs on subsidy	Mobilisation of farmers for purchase of seed, agro-chemicals, equipment under subsidy from agri input stores	
	National food security mission - Pulses	1. Demonstration	Cropping system-based cluster demonstration	Farming practices on the basis of PoP / own experience
		2. Agri. inputs on subsidy	Mobilisation of farmers for purchase of seed, agro-chemicals, equipment under subsidy from agri input stores	
National food security mission - Nutri cereals / millets	1. Demonstration	Frontline demonstration	Farming practices on the basis of PoP / own experience of EO	

No.	Name of Scheme	Components	Remarks	Reference
		2. Agri. inputs on subsidy	Mobilisation of farmers for purchase of seed, agro-chemicals, equipment under subsidy from agri input stores	
		3. Workshop	Creation of awareness, publicity	
2	Rastriya Krishi Vikas Yojna – RKVY - RAFTAR	Vegetable seeds under 50% subsidy	Mobilisation of farmers for purchase of vegetable seeds under subsidy	
3	Prampragat Krishi Vikas Yojna 2015-16 (PKVY)	Organic farming	Promotion of organic farming , and certification through ICCOA or other organic certifying agency	
4	National Mission on Sustainable Agriculture – (NMSA) - RAD	Subsidy on agri. inputs on farming system basis	Mobilisation of farmers for purchase of seed and supply through agri input store	
		Training on farming system	Agro-Silvi-Pastoral farming system-based training to cluster farmers	Farming practices on the basis of PoP / own experience
5	National Disaster Response Fund (NDRF)	Subsidy	Mobilisation of farmers for purchase of seed, ppm, implements and supply through agri input store	
6	Pradhan Mantri Fasal Bima Yojna (Crop insurance scheme)	Financial support	Farmers are motivated for insurance of their crops - filling of farms	
7	SPNF (State funds)	Demonstration		Use of SPNF formulations and other farming practices except use of chemicals on the basis of PoP / own experience
		Training		Farming practices on the basis of PoP / own experience
		Exposure Visit		
		Farm School		
8	Pradhan Mantra Krishi Sinchai Yojna	Subsidy	Booting agricultural production applying MIS	

Source: DoA

(5) State Government Initiatives

The schemes conducted under state government initiatives are shown as follows:

Table 3.2.6 Schemes Conducted under State Government Initiatives

No.	Name of Scheme	Components	Remarks	Reference
1	Mukhya Mantri Khet Sarankhsan Yojna (Fencing)	Subsidy on fencing	Publicity, verification at the site	
2	Uttam Chara Utpadan Yojna (Fodder)	Subsidy on fodder seed	Mobilisation of farmers for purchase of seed and supply through agri input store	
3	Sub Mission on Agriculture Mechanisation 2019-20 - Agri machines	Subsidy on agri. machines	-do- (for tractors)	-
4	Rajya Krishi Yantrikaran Programme – Agri machinery	Subsidy on agri. machines	-do- brush cutters, power weeder, threshers, sprayers	
5	SCSP (Scheduled Castes sub plan)	Trainings	Applicable to SC farmers only	Farming practices on the basis of PoP / own experience
		Subsidy	Subsidy on agri. inputs -do-	
6	BASP (backward area sub plan) for backward panchayats areas	Trainings	Applicable to BA farmers only	Farming practices on the basis of PoP / own experience
		Subsidy	Subsidy on agri. inputs -do-	
7	TSP (Tribal sub plan)	Trainings	Applicable to tribal area farmers	Farming practices on the

No.	Name of Scheme	Components	Remarks	Reference
				basis of PoP / own experience
		Subsidy	Applicable to tribal farmers only	
8	SCA to SCSP	Trainings	Applicable to SC farmers only	Farming practices on the basis of PoP / own experience
		Subsidy	Subsidy on agri. inputs -do-	
9	Dr YS Parmar Kissan Swarojgar Yojna - Poly house	Subsidy	Supply of	
10	Green house renovation scheme			
11	National Mission on Extension and Technology (NMAET) - Seed Village Programme	Trainings		Farming practices on the basis of PoP / own experience
		Subsidy	Seeds, machines	
12	PM Kisan Saman Nidhi Yojna	INR 6000/ farmer/ year to supplement needs of farmers	Motivation of farmers, verification of forms	
13	Quality control - Seed		Done by Seed Inspector working in DDA office	
14	Quality control - PPM		Done by Plant Protection Inspector working in DDA office	
15	Quality control - Fertiliser		Sampling of fertilisers (done by SMS) being supplied in block	
16	Soil Health Card	Demonstration on soil test basis	Soil sampling in cluster of farmers (Adarsh Village) through GPS-based grids	Farming practices on the basis of PoP / own experience of EO
		Training on importance and maintenance of soil health		
17	Support to State Extension Reforms - ATMA			
18	Rajeev Gandhi Micro-irrigation Yojana	Subsidy	Implementation by SDSCO	

Source: DoA

(6) Centre of Excellence

During the year 2015-16, the Govt. of Himachal Pradesh announced to set up Centre of Excellence for vegetable Nursery Production (CoE) as a new initiative to ensure the quality planting material to the farmers especially for poly houses. Initially it was proposed to have CoE in each District but due to budget limitations (Rs. 2.00 crore only/-), the activity was restricted to four Representative vegetable growing Districts of the State i.e. Kangra, Mandi, Shimla & Solan having sizeable area under protected cultivation as well as open field cultivation of vegetables. Out of these four centres, one centre has been set up at Jubbal-Hatti, Shimla and which was completed during Nov. 2016 with an initial capacity of approx. 20-25 lakh seedlings per annum in a soil less media. One such centre is also under process of setting up at Solan (Kandaghat) and remaining two pertaining to District Mandi & Kangra could not be set up due to administrative reasons. The Jubbal- Hatti centre is being run & maintained by Farmers successfully since its completion.

Scale (size, capacity) of major components of the existing Centre is detailed below.

- i. Poly house Framed Structure with Fan & Pad System of 252 sqm. & 560 sqm.
- ii. Micro Irrigation (Boom Irrigation System as per Size of Poly houses).
- iii. Germination Chamber (4mt. x 3mt.)
- iv. Working Area outside close to Nursery unit i.e. Pack House, Water Storage Tank, Control Room etc. (10mt. x 8mt.)

- v. Net house (10mt.x10mt.)
- vi. Store (3mt. x 3mt.)
- vii. Office–cum-Record Room (12mt.x 10mt.)
- viii. Generator Set (12-15 kw.)

Major activity of the Centre is to produce good quality of seedlings of the different kind of vegetables for the farmers. At present, the farmers of the Shimla, Solan, Sirmour, Bilaspur and Mandi Districts arrange the seedlings from this centre. Production of seedlings of different vegetables in the year 2019 is as follows:

i.	Sweet Pepper (Red-Yellow Capsicum)	170,000 seedlings
ii.	Green Capsicum	230,000 seedlings
iii.	Tomato	130,000 seedlings
iv.	Chili	10,000 seedlings
v.	Cauliflowers	20,000 seedlings
vi.	Broccoli	10,000 seedlings
vii.	Cucurbits	580,000 seedlings

At present there is no responsibility of the owner of Centre for any type of reporting to DoA, because this is not a Govt. property. Govt. has given only one time assistance to the private individual farmer for establishing this Centre in personal capacity. However, any type of information/data regarding this Centre can be shared by the owner with DoA if required.

Since the said Centre of Excellence is a personal asset, therefore there is no facility of class room, boarding, lodging facilities and other logistic support and hence at present, it may not be possible to organise trainings of farmers and extension officers at this centre.

(7) Agricultural Extension System

(a) Agricultural Extension Organization

In Himachal Pradesh, Department of Agriculture (DoA) is responsible for the planning and implementation of agricultural programmes and schemes in the State. According to functions, the DoA is broadly classified into two sections i.e. Extension Section and Soil Conservation Section as shown in the following Figure 3.2.1.

Regarding extension activities in H.P., the Director is supported by Joint Directors at the State level and Deputy Directors at the district level. The development unit is ‘block’, which is managed by Subject Matter Specialist (SMS), who is supported by Agricultural Development Officers (ADOs) and Agricultural Extension Officers (AEOs).

The Department runs one Farmers’ Training Centre (FTC) at Sundernagar in District Mandi. Trainings are conducted for farmers, farmers organizations and the block-level and village level extension staffs.

The extension activities at the block level are carried out for cereals, vegetables, pulses, and oil seeds related to following fields:

- i. Production skills
- ii. Protection skills
- iii. Pest management

(b) Number of Extension Officers

The number of extension officers in the Department of Agriculture (as on August 2020) is shown in Table 3.2.1 and Table 3.2.2.

As shown in the Table 3.2.1, there are almost 30% vacancy of extension officers who are involved in the agricultural extension activities in H.P.

(c) Major Extension Activities at the Block Level

The major daily extension activities of the extension officers at the block level can be summarized as follows:

- i. Distribution and monitoring of agriculture inputs (seeds, plant protection materials and equipment)
- ii. Accounts Maintenance related to distribution of inputs
- iii. Organization of training camps
- iv. Field Demonstration
- v. Field visits of extension officers
- vi. Exposure visits for farmers
- vii. Soil sample collection,
- viii. Crop cutting experiment of maize and paddy, and
- ix. Regular work (Capacity building of officers, review meetings, preparation of progress reports, farmers visits to the offices, Organization of groups, field days, exhibitions)

Extension officers in block offices have to spend more time in input distribution including seeds (cereals, and vegetables), plant protection materials and equipment during most of the year, and in particular they are more busy in the beginning of Kharif and Rabi seasons. Besides, they also have to maintain the accounts regularly for the input distribution. However, the various extension activities including organization of training camps, field demonstration, field visits for farmers under the current schemes as shown in Table 3.1.1 and Table 3.1.2 are carried out in each Development Block. Meanwhile, soil sample collection and crop cutting experiments are also conducted annually. Those activities are occupied in about 40% of their total time.

For the crop diversification, various activities such as farm demonstration trials, organizing training camps, exposure visits etc. need to be carried out in a more intensive manner. In the present condition, the extension officers are occupied for 60% of the time for the input distribution and the regular office works. If the input distribution can be carried out by some cooperative similar to fertilizer distribution in the State, it would save a lot of burden for extension officers, and they can focus more on the extension activities.

(d) Constraints and their Countermeasures in Agricultural Extension System

Constraints and their Countermeasures in agricultural extension system are summarized below.

Table 3.2.7 Constraints and their Countermeasures in Agricultural Extension

Current Conditions / Constraints	Countermeasures
Insufficient number of staff compared with sanctioned posts	Recruitment of qualified persons and posting them in vacant posts.
Inefficient information system and untrained staff for state-wide project implementation and quick decision making	Capacity building of staffs shall be carried out on planning, implementation, monitoring and evaluation of crop diversification
Not high & timely mobility of staff because of insufficient transportation means	Consideration of cost on transportation in budgetary arrangement for current schemes which are sponsored by central government and state government as well
Insufficient survey and measurement tools and instruments for planning & design	Necessary equipment and tools should be provided to department, district and block offices, and soil conservation offices for implementation of crop diversification
The present extension activities are more focused towards distribution of inputs and therefore, less attention is paid on extension.	Time allotment should be re-considered. Further they have to put priority into their activities.
The linkage between the extension-research-farmers are still lacking.	Periodical meetings and workshops should be conducted among the research institutes, extension departments and farmers' representatives at the state and district level.

	Research & extension linkage shall be strengthened through field visits of researchers together with extension officers in order to cope up with on-going constraints in the field, and linking of research activities matching demands of the farmers
Lack of monitoring and evaluation system	Proper monitoring and evaluation of extension activities should be carried out, considering PDCA cycle.

Source: JICA Survey Team

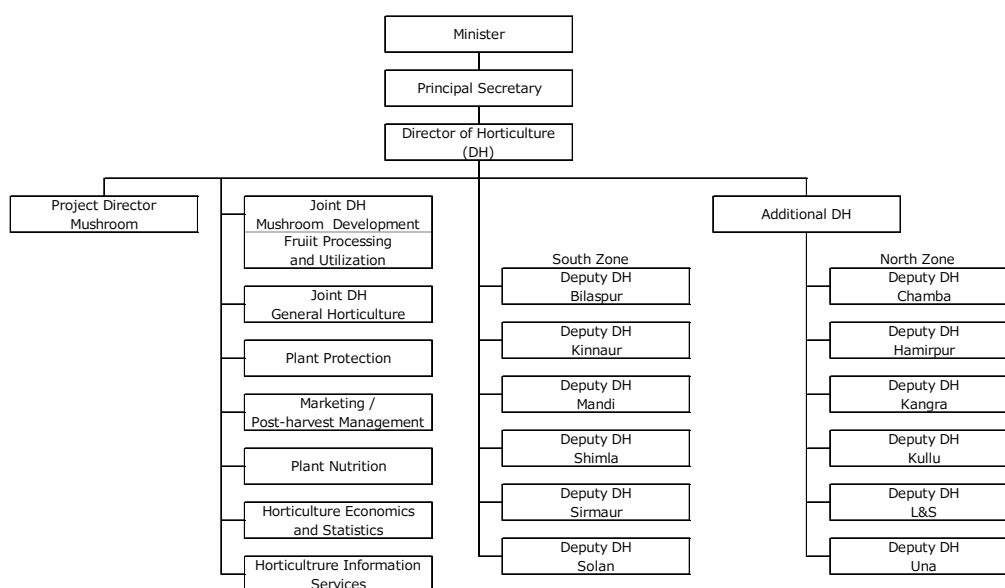
3.2.2 Department of Horticulture (DoH)

(1) Function of DoH

The DoH of the state government is fully responsible for carrying out the following mandates:

- i) To diversify the traditional farming system based on subsistence agriculture to commercial market-oriented farming system based on high income generating cash crops like fruits, flowers, mushrooms, medicinal plants, and so on;
- ii) To harness the ecological niches for the promotion of environment-friendly farming system suited to the different agro-climatic conditions of the state;
- iii) To create conditions, infrastructure, services and facilities for improving the levels of farm income and employment by increasing production, productivity and quality of produce thereby improving the quality of life of the rural population;
- iv) To use science and technology to a greater extent for the optimum utilisation of the state's horticulture potential and for that to develop, introduce, adapt and extend appropriate technology for adoption at the farm level; and
- v) To formulate and implement sound and scientific plans for the development of horticulture in Himachal Pradesh with equal participation from the farmers, farmers' organisations and the industry.

The DoH functions under the administrative control of the Principal Secretary (Horticulture) of the Government of Himachal Pradesh, and is headed by the Director of Horticulture with headquarters at Shimla. Its organisation is illustrated in Figure 3.2.2. In the headquarters, the Director of Horticulture is assisted by the Joint Director of Horticulture, Deputy Directors of Horticulture and Subject Matter Specialists at the directorate level. There are seven specified divisions in the directorate, consisting of General Horticulture, Plant Nutrition, Plant Protection, Marketing and Post-harvest Management, Fruit Processing and Utilisation, Horticulture Economics and Statistics, and Horticulture Information Services.



Source: DoH

Figure 3.2.2 Organizational Chart of the Department of Horticulture of Himachal Pradesh

The Deputy Directors of Horticulture are posted in each district to implement and co-ordinate all the horticulture activities in their respective districts. They are assisted by District Horticulture Officer in extension and input supply as well as Subject Matter Specialists in the field of orchards and nurseries, plant protection, floriculture and marketing, depending upon the scope of activities in the concerned district.

The Horticulture Development Officers have been provided at each Development Block Horticulture Centre for implementation of the horticulture development schemes and providing extension services to the fruit growers. These Horticulture Development Officers are assisted by the Horticulture Extension Officers of Horticulture Extension Circle who are the grass roots functionaries of the DoH.

The number of technical officers in the DoH (as of August 2020) is shown below.

Table 3.2.8 Extension Officers in DoH (As of August 2020)

Position	Sanctioned Posts	Filled-up Posts	Vacant Posts
Director of Horticulture	1	1	0
Addl. Director of Horticulture	1	0	1
Joint Director of Horticulture	2	2	0
Horticulture Economist	1	0	1
Sr. Marketing Officer	1	1	0
Sr. Plant Protection Officer	1	1	0
Sr. Analytical Officer	1	0	1
Fruit Technologist	4	4	0
Dy. Director of Horticulture (Inf.)	1	1	0
Dy. Director of Horticulture	13	13	0
Subject Matter Specialist	74	66	8
Horticulture Development Officers	264	134	130
AHDO/Horticulture Extension Officer	512	391	121
Total	875	614	261

Source: <http://www.hpagnisnet.gov.in/hpagnis/horticulture/Default.aspx?SiteID=5&PageID=1175>, DoH, Shimla, August 2020

(2) Horticulture Research

The state government has set up Dr. Y. S. Parmar University at Nauni in Solan District in December 1985 with the following mandate:

- i) Provision of education in horticulture, forestry and allied disciplines;
- ii) Advancement of basic and applied research pertaining to horticulture, forestry and allied disciplines;
- iii) Extension and dissemination of scientific information amongst rural masses;
- iv) Development of linkages with state/central/international institutions, NGO, orchards, farmers and industries for achieving economic and ecological security; and
- v) Other activities that the university may determine from time to time.

Research works are carried out in the existing network as listed up in Table 3.2.9.

Table 3.2.9 Regional Network of Horticulture Research in Himachal Pradesh

Zone	Regional Level	Satellite Level
Low hill and valley areas near the plains (Sub-tropical)	- Regional Horticulture Research Station at Jach in Kangra District	- Horticulture and Forestry Research Station at Neri in Hamirpur District
	- Regional Horticulture Research Station at Bhota in Hamirpur District	- Litchi and Mango Research Station at Nagrota Bagwan in Kangra District
		- Horticulture Research Station at Dhaulakuan in Sirmaur District
Mid hills (Sub-temperate)		- Horticulture Research Station at Katrain in Kangra District
		- Horticulture Research Station at Seobagh in Kangra District
		- Horticulture Research Station at Kandaghat in Solan

		District
High hills and valleys in the interiors (Temperate)	- Regional Horticulture Research Station at Mashobra in Shimla District	- Forestry Research Sub-station at Rahla in Kullu District
		- Temperate Horticulture Research Station at Kotkhai in Shimla District
Cold and dry zone (Dry Temperate)	- Regional Horticulture Research Station at Sharbo in Kinnaur District	- Vegetable Research Station at Kalpa in Kinnaur District
		- Horticulture Research Sub-station at Tabo in Lahaul-Spiti District

Source: DoH

(3) Horticulture Extension

For advisory services on fruit plant nutrition, three Plant Tissue Analysis Laboratories have been established in Kangra, Kullu and Shimla districts in which around 10,000 to 13,000 plant issue samples are analysed annually for the diagnosis of the nutritional disorders and recommendations for dosages for fertiliser application. This has helped the orchards in making judicious use of chemical fertilisers.

The supply of pesticides is arranged through 337 sales outlets established in the fruit growing areas by the DoH. Every year, around 225,000-ha area is covered under plant protection activities, and the pesticides are distributed to the farmers every year. A Biological Control Laboratory to decrease the chemical use in pests control has also been established in Shimla District.

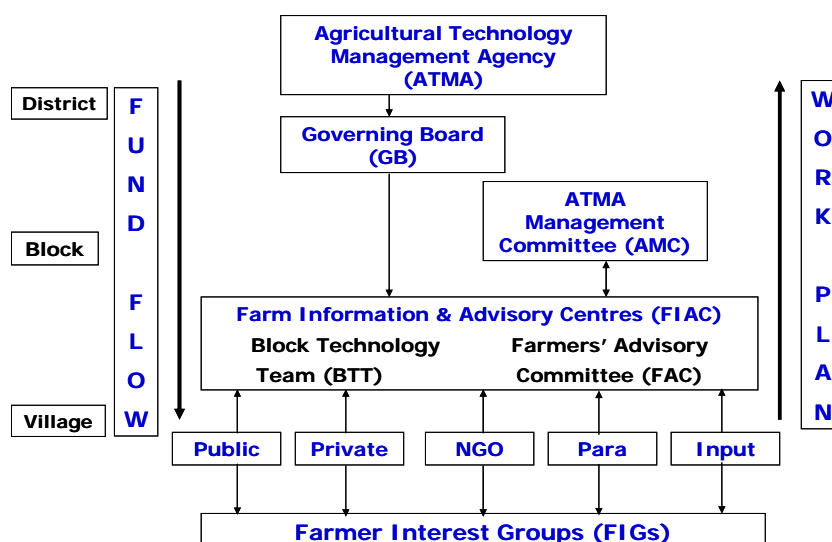
The horticulture extension services have been strengthened up to the grass roots level. In addition, the programmes on the farmers training, demonstrations, fruit shows, exhibitions, seminars and workshops are organised for the dissemination of the technical knowhow to the farmers.

3.2.3 Agricultural Technology Management Agency (ATMA)

ATMA is an autonomous institution with participation of all the key stakeholders involved in agricultural activities for sustainable agricultural development in the district. It has the flexibility to receive funds directly (Government of India / States, membership fees, beneficiaries' contribution etc).

ATMA has the main responsibility of all the technology dissemination activities at the district level. It has linkages with all the line departments, research organizations, non-governmental organizations and agencies associated with agricultural development in the district with a substantial representation of farmer organizations. Research and extension units within the district, Department of Agriculture, Horticulture, Animal Husbandry, Fisheries, Marketing etc. are constituent members.

The organizational structure of ATMA is shown as follows:



Source: DoA

Figure 3.2.3 Organizational Structure of ATMA

Each district ATMA is under jurisdiction of Governing Board chaired by District Magistrate and having 9 officers and 7 other members, ATMA Management Committee (AMC) consisting of 7 official

members, and Farmers Advisory Committee (FAC) with 12 members. The programmes and procedures concerning district-wise activities are determined by ATMA, Governing Board and implemented by its Management Committee. In order to manage programme implementation at block level and below, ATMA has established a Farm Information and Advisory Center (FIAC) at each block in the district. In effect the FIACs act as extension planning and operational arm of ATMA. These are supported by two groups; one, a group of technical officers at block derived from different functional areas termed as Block Technology Team (BTT) whereas, the others is a Farmers Advisory Committee (FAC) which is a body exclusively of farmers. While BTT develops the Block Action Plans (BAPs) in light of the SREP and is responsible for its implementation, the FAC plays a more proactive role by scrutinizing, improving and approving BAPs, before these are referred to the ATMA GB for its final approval.

Commodity oriented Farmer Interest Groups (FIGs) are promoted at block/ village level to make the technology generation / dissemination farmer driven and farmer accountable. These Village level FIGs are ultimately federated at block / district level and represented in FACs and GB. In order to address the extension needs of these groups, ATMA has established close linkages with various players operating at cutting edge level viz., public, private, NGOs, Para extension workers and input dealers etc. 2 to 3 Assistant Technology Managers (ATM) and one Block Technology Manager (BTM) are envisaged each block under this scheme.

Activities carried out under ATMA are mentioned below.

1) Farmer Oriented Activities:

- Training of Farmers:
- Demonstration
- Exposure Visit:
- Mobilization of Farmer Groups:
- Reward & Incentive for Best Group
- Best Farmer Awards

2) Farm Information and Dissemination:

- District Level Kisan Mela/ Exhibitions
- Information dissemination through Printed Leaflets/ Local Advertisement

3) Agriculture Technology Refinement, Validation and Adoption:

- Farmers-Scientist Interactions
- Field Days with Strengthen Research-Extension-Farmers linkages
- Assessment, Refinement and Validation of technologies

Under the current situation, the State Government of Himachal Pradesh addressed to promote Zero Budget natural Farming (ZBNF), which was developed by Mr. Subhash Palekar in the State of Maharashtra. This farming system has been promoted through extension activities under ATMA since 2018. At present, this ZBNF has been renamed SPNF (Subhash Palekar Natural Farming). ATMA has focused this SPNF in agricultural sector.

The objectives of the SPNF are shown as follows:

- 1) To reduce cost of cultivation and increase productivity to double farmers' income through sustainable farming.
- 2) To create awareness amongst farming community and society about natural farming
- 3) To improve soil fertility, porosity, water infiltration, water holding and soil micro-flora and Fauna
- 4) To detach farmers from buying any input from the market by discouraging use of agro-chemicals
- 5) To produce and feed chemical free produce and to promote climate resilient farming in harmony with nature
- 6) To prepare package of practices for different SPNF grown crops for broader outreach to the masses

This scheme envisions enhancing farm, income in harmony with nature by adopting low cost climate resilient SPNF system.

The scheme aims to follow the State's vision of increasing agriculture production and double farmers' income by the year 2022. A phased manner timeline for covering all the 961,000 farm families by 2022 to aware SPNF practices is given as follows:

Table 3.2.10 Target Farmer Families under SPNF

Year	No. of Farmer Families	Families to be covered (%)
2018-19	500	0.1
2019-20	50,000	5.2
2020-21	200,000	20.8
2021-22	350,000	36.4
2022-23	360,265	37.5
Total	960,765	100.0

Source : ATMA

3.2.4 State Agricultural Management and Extension Training Institute (SAMETI)

The State Agricultural Management and Extension Training Institute (SAMETI) is registered as an autonomous institute with the mandate of capacity building of extension functionaries for promoting agricultural development. It conducts courses on participatory extension management, project management, watershed management, human resources management and information technology. It also provides consultancy in agricultural extension management. It provides facilities for conducting training, having well-equipped training halls with conference system and multimedia projection facility.

(1) Aims and Objectives of SAMETI

The main aims and objectives of SAMETI are as follows:

- i) To function as a State Agricultural Management and Extension Training Institute at the state level and to provide extension management input for extension functionaries of agriculture and line departments.
- ii) To develop systematic linkages between line departments, state universities and regional and national institutions of outstanding accomplishment in the field of agriculture.
- iii) To study agricultural extension management systems and policies together with operational problems and constraints at all levels.
- iv) To promote and develop the management tools for improving the effectiveness of agricultural extension services through the mechanism of personnel management, resource management and input management.
- v) To organise need-based training for senior, middle and grass roots level functionaries for developing skills in executing extension.

(2) Governing Council of SAMETI

The Himachal Pradesh State Government constitutes the Governing Council of SAMETI. The Governing Council takes all major policy decisions, and reviews and monitors the performance and progress. The directions of the Governing Council are implemented by the institute authorities.

Table 3.2.11 Governing Council of SAMETI

1	Financial Commissioner cum Secretary Agriculture to the Government of HP	Chairman
2	Director of Agriculture HP	Vice Chairman
3	Director of Horticulture HP	Member
4	Director of Animal Husbandry HP	Member
5	Director of Fisheries HP	Member
6	Director of Extension Edu. CSKKW Palampur	Member
7	Director of Extension Edu. UHF Nauni Solan	Member
8	Rep. of Directorate of Extension, GOI, MOA Krishi Bhawan New Delhi	Member
9	Rep. of National Institute of Agr. Extension and Management (MANAGE) Hyderabad	Member
10	Joint Director of Agri. (Extension and Training) Department of Agriculture HP	Member
11	Director SAMETI Mashobra HP	Member Secretary

Source: SAMETI

(3) Executive Council of SAMETI

The Executive Council takes decision with respect to routine matters and also scrutinises the major policy proposals before the same are sent to the Governing Council. The Executive Council also reviews all financial and physical progress reports of SAMETI. The following are the members of the Executive Council:

Table 3.2.12 Executive Council of SAMETI

1	Director of Agriculture HP	Chairman
2	Director of Horticulture HP	Member
3	Director of Animal Husbandry HP	Member
4	Joint Director of Agri. (Extension and Training) Department of Agriculture HP	Member
5	Director SAMETI Mashobra HP	Member Secretary

Source: SAMETI

(4) Academic Committee

The Academic Committee has been constituted by GC SAMETI to identify the training needs, finalise and evaluate the training programmes, and to cater to the desired needs of sponsoring organisations/agencies and all line departments. The SAU and one representative from the stakeholders are its formal members.

Table 3.2.13 Academic Committee of SAMETI

1	Director of Extension Edu. UHF Nauni Solan.	Chairman
2	Director of Extension Edu. CSKKW Palampur.	Member
3	Director of Horticulture HP	Member
4	Director of Animal Husbandry HP	Member
5	Joint Director of Agri. (Extension and Training) Department of Agriculture HP	Member
6	Principal EEI Nilokheri	Member
7	One Project Director ATMA on rotation basis	Member

Source: SAMETI

(5) Technical Staff of SAMETI

There are some technical staff in SAMETI as follows:

Table 3.2.14 Technical Staff of SAMETI

	Name of Post	Sanctioned post	Filled in	Vacant
1	Director	1	1	-
2	Vice Principal	1	1	-
3	Training Officer	3	2	1
4	SMS	2	-	2
5	ADO	1	-	1
6	AEO	1	1	-
7	JE	1	1	-
8	Computer Operator	1	1	-
	Total	11	7	4

Source: SAMETI

(6) Resource Bank Institutes

The Minutes of Understanding (MOU) has been signed with State Agriculture Horticulture Universities and developed linkages with state and national institutes. Collaborative workshops/trainings are also being organised by SAMETI with State Agricultural Universities, MANAGE Hyderabad, and NIAM Jaipur, EEI Nilokheri. Computer application programmes are organised in collaboration with DOEACC Shimla.

Table 3.2.15 Resource Bank Institutes of SAMETI

Area	Institute
HRD and Extension Management	MANAGE Hyderabad, EEI Nilokheri, UHF Nauni Solan, CSKKVV Palampur, RC Entrepreneurship Development Chandigarh
Marketing Management	MANAGE, NIAM Jaipur, Agro Economic Research Centre Shimla, CITA (centre for international trade in agriculture and agro-based industry)
Technical/ Post Harvest Management	State Agricultural Universities, CPRI Shimla, Agri and Line Departments, Dir of Seed Cert. Tamil Nadu
Information Technology	MANAGE Hyderabad, DOEACC Shimla
Organic Farming Management	Uttaranchal Organic Commodity Board Dehradun, Morarka Foundation Jaipur, State Agricultural Universities

Source: SAMETI

(7) Areas of Training

The mandate of SAMETI is to promote the extension and management tools for improving efficiency in extension services.

The training emphasis is laid on the following aspects:

- i) Extension Management Skills
- ii) Participatory Approaches and PRA Tools
- iii) Group Mobilisation and Team Building
- iv) Human Resource Management
- v) Farming System Approach
- vi) Public Private Partnership and Farmer-led Extension
- vii) Market-led Extension and Marketing Management
- viii) IT and Cyber Extension
- ix) Gender Issues and Women Empowerment
- x) Project Formulation and Management
- xi) Quality Control Input Management Programmes (seed control order, fertiliser quality control, pesticide act, etc.)

(8) Training in SAMETI

Training programmes which were conducted at SAMETI in the fiscal year of 2019-20 are shown in the following table.

Table 3.2.16 Training Progress at SAMETI in 2019-20

I. SAMETI Sponsored Training

Sr. No.	Title of Course	Category of Participants	No. of Participants	Gender		Days
				Male	Female	
1	Advance Computer Course	BTT Members/ others	20	15	5	5
2	Orientation on SAME for FAC Members	FAC Members	25	23	2	3
3	Training on Stress Management	BTT Members/ others	18	11	7	4
4	Training on Project Management	DoA and DoH Officers	22	18	4	3
5	Training on Doubling Farmers income	Progressive Farmers	29	23	6	2
6	Gender Sensitization	BTT Members	23	18	5	3
7	Training on Managerial Skill for EOs	BTT Members	18	12	6	3
8	Training on Group Mobilization	Progressive Farmers	31	14	17	3
9	Climate Change and Agriculture	BTT Members	23	18	5	3
10	Extension Management & HRD Skills	BTT Members	14	12	2	3
11	Home Scale Fruits and Veg. Preservation	Women Farmers	21	0	21	4
12	Accounts Management and Tally Application	ATMA Functionaries	24	21	3	4
13	Academic Committee	AC Members	11	10	1	1
	Total (I)		279	195	84	41

Source: SAMETI, October 2020

II. Department of Agriculture Sponsored Training

Sr. No.	Title of Course	Category of Participants	No. of Participants	Gender		Days
				Male	Female	
1	Natural Farming System	Progressive Farmers	36	33	3	2
2	Orientation/Induction Course for New ADOs	ADOs	23	9	14	9
3	Promoting FPO Issues and Challenges	Department Officers	22	18	4	3
4	Training on CCS Rules of CCA Rules	Supdt./ Sr. Asstt/ Clerk	15	14	1	2
5	Workshop on Agriculture Export Policy	Deptt, FPOs, Farmers	180	155	25	1
6	Training on DBT and Cashless Transaction	Agri. Officers	20	17	3	3
7	PKKS Worksho	Deptt Officers / Farmers	269	250	19	1
8	Climate Change & Doubling Farmers Incomes	Progressive Farmers	40	27	13	2
9	Refresher Course	BTMs/ATMs	47	33	14	3
10	Induction Training Programme	BTMs/ATMs	48	30	18	6
11	Induction Training Programme	ATMA Functionaries	44	31	13	6
	Total (II)		744	617	127	38

Source: SAMETI, October2020

III. Department of Horticulture Sponsored Training

Sr. No.	Title of Course	Category of Participants	No. of Participants	Gender		Days
				Male	Female	
1	Recording Keeping for HEOs	HEOs	19	17	2	3
2	Cluster Development Plans (irrigation)	Relevant officers	57	52	5	4
3	Training on Induction cum Orientation	HDOs	30	5	25	6
4	Training on Induction cum Orientation	HDOs	25	9	16	6
5	Training on PSG and Diary / Dispatch	Sr. Asstt/ Clerk	24	22	2	2
6	Training on Fruit & Vegetable Preservation	HEOs	21	19	2	3
7	Training on Doubling of Farmers Income	SMS/ HDOs	21	10	11	3
8	Training on BRICS CAD	AE/ JE/ Draghtsman	25	18	7	2
9	Training cum Workshop for Facilitator	Facilitators	34	22	12	1
	Total (III)		256	174	82	30

Source: SAMETI, October2020

IV. Other Departments Sponsored Training

Sr. No.	Title of Course	Category of Participants	No. of Participants	Gender		Days
				Male	Female	
1	Training on Treasury Rules	JOA (IT)/ Clerk	28	28	0	3
2	Training on Treasury Rules	JOA (IT)/ Clerk	32	28	4	3
3	Training on Treasury Rules	JOA (IT)/ Clerk	30	29	1	3
4	Training on Core Extension Officers	Agri. Officers	17	16	1	2
5	Training on Treasury Rules	JOA (IT)/ Clerk	34	26	8	3
6	Training on Treasury Rules	JOA (IT)/ Clerk	28	28	0	3
7	Training on Treasury Rules	JOA (IT)/ Clerk/ CO	35	24	11	3
8	Workshop for Treasury Officers	DTOs/ TOs	63	56	7	1
9	Training on Treasury Rules	JOA (IT)/ Clerk	31	25	6	3
10	Training on Treasury Rules	Supdt. G-II	37	29	8	3
11	Training on Treasury Rules	Sr. Asstt. JOA (IT), Clerk	36	33	3	3
12	Training on Treasury Rules	Sr. Asstt.	38	27	11	3
13	Training on Treasury Rules	JOA (IT) / Clerk	35	30	5	20
14	Orientation on e-NAM	Marketing Board, E-NAM staff	28	23	5	2
15	RTraining Programme on E-applicatio	Panchayat Secretaries	29	21	8	2
	Total (IV)		501	423	78	57

Source: SAMETI, October2020

(9) Infrastructure Facilities of SAMETI

- i) Administrative block is housed in the old heritage building having beautiful lawns and surrounded by natural scenic beauty of snow peaks.
- ii) Two seminar halls are fully equipped with conference system and teaching aids including multimedia projection with seating capacity of 50 participants each.
- iii) One IT lab has been established with 16 Nos. of computers with internet and LAN setup.
- iv) Library is equipped with fascinating books on Indian history, tradition, culture as well as latest books on Extension, HRD, Marketing and other related areas.
- v) Hostel: All SAMETI 2-bedded rooms are provided with facilities like TV facilities, etc. Capacity of SAMETI hostel is 38 participants and two sets for resource persons; in addition to this, four spacious dormitories exist with the capacity of 8 persons each.
- vi) Hostel mess is running on contract basis providing good nutritious food.
- vii) SAMETI has latest teaching IT and non-IT equipment including computers, multimedia projector, laptop, printers, OHP, direct projector, slide projector, photocopier, scanner, conference system, etc. providing excellent training atmosphere.

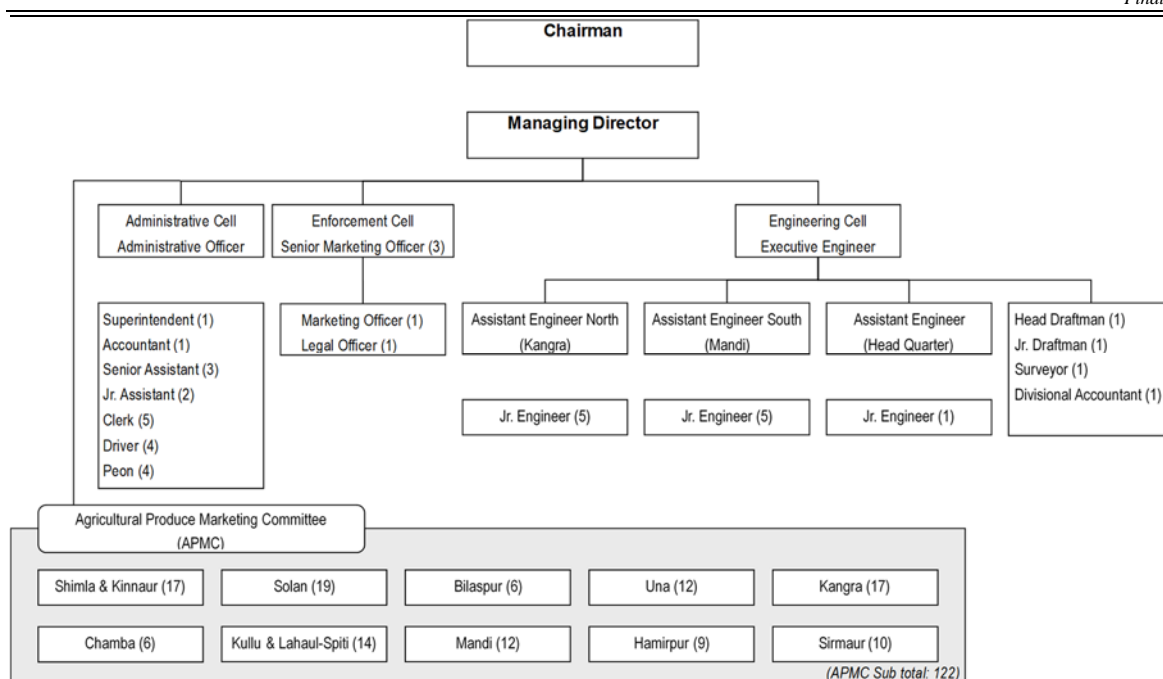
(10) Proposal for the Involvement of SAMETI in the Action Plan

Since SAMETI has the excellent facilities to arrange trainings and workshops, along with the resource persons in various disciplines, it is proposed that the following activities of the Action Plan shall be carried out in cooperation with SAMETI:

- i) Arrangement of capacity building trainings on technical and management aspects of crop diversification for the extension trainers
 - Trainers for Capacity Building
 - Arrangement of Hall
 - Training Materials
- ii) Periodical meetings and workshops among the researchers, extension officers and farmers at the state and district level
 - Arrangement of Hall
 - Training Materials

3.2.5 Himachal Pradesh State Agriculture Marketing Board (HPSAMB)

Aiming at the smooth implementation of market activities as well as promotion of farmers' benefits, the Himachal Pradesh Agricultural and Horticulture Produce Marketing Act was established, and in the act, private trading and contract farming are also included. In Himachal Pradesh, ten Agricultural Produce Marketing Committees (APMC) have been established and cover 12 districts under the supervision of the HPSAMB, in order to conduct a smooth marketing of agricultural produce. The organisation of the Board and ten APMCs are shown in Figure 3.2.4 and their staffing is shown in Table 3.2.17.



Source : HPSAMB

Figure 3.2.4 Organisation and Staffing of Himachal Pradesh State Agricultural Marketing Board

Office	Position	Sanctioned Posts	Presently Filled up Posts
Marketing Board	Chairman	1	1
	Managing Director	1	1
	Senior Marketing Officer	3	3
	Marketing Officer	1	1
	Legal Officer	1	1
	Executive Engineer	1	1
	Assistant Engineer (HQ)	1	1
	Jr. Engineer	1	1
	Assistant Engineer (North)	1	1
	Jr. Engineer	5	5
	Assistant Engineer (South)	1	1
	Jr. Engineer	5	5
	Head of Draftman	1	1
	Jr. Draftman	1	1
	Surveyor	1	1
	Divisional Accountant	1	1
	Administrative Officer	1	1
	Superintendent	1	1
	Accountant	1	1
	Senior Assistant	3	3
Jr. Assistant	2	2	
Clerk	5	5	
Driver	4	4	
Peon	4	4	
Sub-total	47	47	
APMC Bilaspur	Secretary	1	1
	Assistant Secretary	-	-
	Market Supervisor	1	1
	Other staff	9	4
	Sub-total	11	6
APMC Chamba	Secretary	1	1
	Assistant Secretary	-	-
	Market Supervisor	1	1
	Other staff	9	4
Sub-total	11	6	

Source: H. P. State Agricultural Marketing Board, September 2008

Office	Position	Sanctioned Posts	Presently Filled up Posts
APMC Hairpur	Secretary	1	1
	Assistant Secretary	-	-
	Market Supervisor	1	1
	Other staff	11	7
	Sub-total	13	9
APMC Kangra	Secretary	1	1
	Assistant Secretary	1	1
	Market Supervisor	3	2
	Other staff	22	13
	Sub-total	27	17
APMC Kullu & LS	Secretary	1	1
	Assistant Secretary	1	-
	Market Supervisor	3	2
	Other staff	20	11
	Sub-total	25	14
APMC Mandi	Secretary	1	1
	Assistant Secretary	1	1
	Market Supervisor	3	1
	Other staff	19	9
	Sub-total	24	12
APMC Shimla&Kinnaur	Secretary	1	1
	Assistant Secretary	1	1
	Market Supervisor	4	3
	Other staff	22	12
	Sub-total	28	17
APMC Sirmaur	Secretary	1	1
	Assistant Secretary	-	-
	Market Supervisor	1	1
	Other staff	12	8
	Sub-total	14	10
APMC Solan	Secretary	1	1
	Assistant Secretary	1	1
	Market Supervisor	3	3
	Other staff	22	14
	Sub-total	27	19
APMC Una	Secretary	1	1
	Assistant Secretary	-	-
	Market Supervisor	1	1
	Other staff	11	10
	Sub-total	13	12
Total		240	169

Table 3.2.17 Staffing of Himachal Pradesh State Agriculture Marketing Board and Ten Agricultural Produce Marketing Committees

Each APMC has the responsibility for the control of regulated (primary market) and sub-market (secondary market) yards. Currently, there are 39 market yards including regulated and sub-market yards in the state. The number of organisational staffs of the Marketing Board is 47 persons, whilst the number

of staffs in ten APMCs is 122 persons as shown in Table 3.2.17. Compared with the sanctioned posts, the existing number of staffs is limited so that it is difficult to manage market yards smoothly and effectively. Especially, each APMC has limited staffs for price collection from each market yard concerned.

In each APMC, there are several Commission Agents that sell produce to buyers through auction. Buyers are imposed to pay 6% of sold amount that is 5% of commission fee for each Commission Agent (CA) and 1% of market fee for APMC. Payment from CA to APMC has been done every 15 days. This market fee is saved in APMC, and then utilised for improvement of system as well as operation and maintenance for APMC. Meanwhile, 25% of the total market fee mentioned above is credited as Marketing Development Fund in the Board. This Marketing Development Fund is utilised for the discharge of functions entrusted to the Board under the act.

3.2.6 Agricultural Universities

The agriculture universities and research institutes, which are involved in agricultural research and education in Himachal Pradesh, are mentioned below.

Agricultural Universities:

- Himachal Pradesh Agriculture University, which is called as Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya (CSK HPKV)) located in Palampur, Kangra District
- Dr Y.S.Parmar University of Horticulture and Forestry (YSP UHF), located in Nauni, Solan District

Research Institutes:

- Agro-Economic Research Centre (AERC) at the Himachal Pradesh University, Shimla
- Central Potato Research Institute (CPRI), Shimla
- National Research Center for Mushroom (NRCM), Solan
- Indian Agricultural Research Institute (IARI) Regional Station, Shimla
- Indian Agricultural Research Institute (IARI) Regional Station, Katrain, Kullu Valley
- National Bureau of Plant Genetic Resources Regional Station, Shimla
- Institute of Himalayan Bioresource Technology (IHBT), Palampur
- G.B. Plant Institute of Himalayan Environment and Development, Himachal Unit, Mohal-Kullu.

A brief description on the mandate and their involvement in the agricultural research, education and extension activities are given below.

(1) Himachal Pradesh Agriculture University

The university was established in 1978 with the mandate of imparting education in agriculture and allied sciences, furthering advancement of learning in hill agriculture by research and undertaking extension of scientific knowledge to the farmers of Himachal Pradesh.

Besides offering academic programmes, advanced education and research are conducted in the fields of agriculture, veterinary, home science, and basic sciences. The university has been giving priority to location-specific, need-based and problem-oriented research with multi-disciplinary approach at main campus in Palampur and research stations and sub-stations. The Directorate has research network at the main campus and three research stations at Bajaura (Kullu), Dhaulakuan (Sirmour) and Kukumseri (Lahaul) and 11 research sub-stations at Kangra, Nagrota, Malan, Berthin, Akrot, Sundernagar, Katrain, Leo, Lari, Sangla and Salooni.

The university also shares the responsibility for planning, implementation and coordination of various extension education programmes of all the departments of four constituent colleges and research centres in close collaboration with the State Departments of Agriculture, Animal Husbandry, Fisheries and other concerned departments and institutions. It conducts a large number of trainings at the main campus and at its eight Krishi Vigyan Kendras (KVK) at Bajaura, Dhaulakuan, Hamirpur, Una, Mandi, Kangra, Berthin and Kukumseri. KVKs provide training and field demonstration on latest agricultural techniques. After integration of research and extension setup, the KVKs are working in close coordination with

R&E Centres. Agricultural Technology Information Centre is functional at the main entrance of the university.

(2) Dr Y.S. Parmar University of Horticulture and Forestry (YSP UHF)

In December 1985, the Horticulture Complex of HPU got the recognition of Dr Yashwant Singh Parmar University of Horticulture and Forestry, Solan. It is playing an important role in increasing horticulture production in the State of Himachal Pradesh in particular and in the country in general. The mandate of the university includes the following:

- Providing education in horticulture, forestry and allied branches of learning and scholarship;
- Advancement of basic and applied research pertaining to horticulture, forestry and other allied sciences;
- Extension and dissemination of scientific information among rural farmers of HP; and
- Developing linkages with the state/central/international institutions, NGOs, orchardists, farmers and industrialists in the state towards the promotion of horticultural development.

Vocational Training Program for Youth:

Vocational training courses on horticulture management are run by the Directorate of Extension Education through Regional Horticulture Research Stations at Jachh, Bajaura, Mashobra, Sharbo, Kotkhai and Dhaulakuan and KVK Chamba. This course is meant for imparting training in horticulture to youths from different districts of Himachal Pradesh involved in farm management. The youths and farm women having matriculate qualification and belonging to rural background are eligible for this training. No fee is collected from the participants, but boarding and lodging charges are to be borne by the participants.

Vocational Training Program for Horticulture Supervisors and Entrepreneurs

Horticulture supervisors and entrepreneurs are enrolled in horticulture trainings sponsored by the Ministry of Agriculture, Government of India under Human Resource Development in Horticulture. The ministry has identified this university as one of the nodal agencies for organising horticulture supervisor and entrepreneurs courses in horticulture for one year and three months, respectively, for the rural youths belonging to the entire temperate region of the country. The aim of this vocational training programme is to generate self-employment to the rural youths by improving their knowledge, skill and attitude for taking up horticulture pursuits to earn their livelihood as well as to act as satellite progressive farmers in their respective areas.

3.2.7 Agricultural Research

(1) Agro-Economic Research Centre (AERC)

The Agro-Economic Research Centre (AERC) at the Himachal Pradesh University was established in December 1972 by the Ministry of Agriculture, Government of India to carry out research and investigations in the field of agricultural economics in the Western Himalayan Region consisting of Himachal Pradesh and Jammu & Kashmir. The broad functions assigned to this centre are:

- To make a study of changes in rural economy by means of survey of a number of selected villages each year and resurvey of the same group of villages at an interval of, say, five years;
- To conduct adhoc investigations into problems of interest to the Ministry of Agriculture, Government of India; and
- To carry out research on fundamental problems relating to agricultural economics of the country.

(2) Central Potato Research Institute (CPRI)

The Central Potato Research Institute (CPRI) under the Indian Council of Agricultural Research (ICAR) is involved in the research on potato related to breeding, biotechnology, culture (crop improvement, crop production), physiology, nutrition, soil and water management, crop protection, engineering, post-harvest technology, extension, and transfer of technology. The mandate of CPRI includes the following:

- To undertake basic and strategic research for developing technologies to enhance productivity

and utilisation of potato.

- To produce disease-free basic seed of different notified varieties developed by the institute.
- To act as national repository of scientific information relevant to potato.
- To provide leadership and coordinate network research with state agricultural universities for generating location- and variety-specific technologies and for solving area-specific problems of potato production.
- To collaborate with national and international agencies in achieving the objectives.
- To act as a centre for training in research methodologies and technology for upgrading scientific manpower in modern technologies for potato production.
- To provide consultancy in potato research and development.

(3) National Research Centre for Mushroom (NRCM)

The National Research Centre for Mushroom (NRCM) at Solan is functioning under the Indian Council of Agricultural Research (ICAR) with a mandate to carry out research, training and extension on all aspects of mushrooms in the country. The centre has been disseminating up-to-date information relating to different aspects of mushroom cultivation technology. Besides, it has also created a general awareness among the people about mushrooms, their nutritional qualities, and their potential as an income-generating high-value crop.

(4) Indian Agricultural Research Institute (IARI) Regional Station, Shimla

The station was started with the mandate of breeding rust-resistant hill wheat variety and barley was added later on. The two approved projects of the station in the early days were:

- Improvement of Wheat for Northern Hills
- Improvement of Barley for Northern Hills

The station has been reviewing and resetting its research priorities from time to time on the basis of previous findings and the ensuing demands of the hill environments prevailing over the region of the northern hills of India where wheat is grown. The mandate of the regional station continues to be wheat improvement with the project entitled “Breeding Disease Resistant and Productive Wheat Cultivars for Northern Hills”.

(5) Indian Agricultural Research Institute (IARI) Regional Station, Katrain, Kullu

The station was established with the following main objectives:

- Production of quality seeds of temperate vegetables and their distribution to the vegetable growers;
- Providing advice on the technology of production of these vegetables and their seeds; and
- Development of new varieties in temperate vegetable crops.

With the realisation of the scope of hybrids in vegetables and their acceptance by the growers, the research mandate has been directed towards developing high yielding hybrids with resistance to major diseases and pests for different zones.

(6) National Bureau of Plant Genetic Resources Regional Station, Shimla

The research station has the major responsibility for the conservation and management of plant genetic resources of western Himalayas comprising Himachal Pradesh and Jammu and Kashmir. A field gene bank of temperate fruits and newly introduced fruit plants and the largest germplasm collection of french bean and buckwheat are maintained at the station. The station has also a facility of medium-term storage for conserving orthodox seeds where seeds can be stored up to 12-15 years without losing viability. This station also acts as National Active Germplasm Site (NAGS) for french bean, buckwheat and temperate fruits. It has strong linkages with the State Agriculture Universities of Himachal Pradesh and Jammu and Kashmir as well as Himachal Pradesh University, Shimla.

(7) Institute of Himalayan Bioresource Technology (IHBT), Palampur

IHBT, a constituent laboratory of the Council of Scientific and Industrial Research (CSIR) India, has a mandate of providing research and development services on economic bioresources in western Himalayan region leading to value added plants, products, and processes for industrial, societal and

environmental benefit. The main research areas include biodiversity conservation, bioprospection, metabolomics, virology, bamboo research and mapping.

(8) G.B. Pant Institute of Himalayan Environment and Development, Himachal Unit

G. B. Pant Institute of Himalayan Environment and Development is an autonomous institute of the Ministry of Environment and Forests, Government of India. The institute is identified as a focal agency to advance scientific knowledge, to evolve integrated management strategies and demonstrate their efficacy for conservation of natural resources, and to ensure environmentally sound development in the entire Indian Himalayan region. All R&D activities of the institute are essentially multi-disciplinary in nature, and based on a conscious effort to interlink natural and social sciences to promote sustainable development.

3.2.8 Agriculture Related Organisation

In Himachal Pradesh State, there are different types of agricultural/farmers organisations, farmers cooperatives, and self-help groups (SHGs) established by different organisations under different programmes as mentioned below.

- Farmers organisations formed under the National Agricultural Technology Project (NATP) of DoA
- Farmers cooperatives formed under Co-operatives Department
- Self-help Groups (SHGs) established under Social Welfare and Empowerment
- Water Users Associations formed by DoA and IPH

(1) Farmers Organisations under NATP of DoA

In the National Agriculture Technology Project (NATP), farmers organisations are formed at the village level which evolve into community associations (CAs), cooperatives and other types of farmers organisations at the block level and district level. The village extension workers of line departments such as AEOs/HEOs/veterinary pharmacists are instrumental in establishing the links with the farming community at the village level. These farmers organisations and farmer interest groups (FIGs) are effectively involved in the preparation of block action plans. These organisations coordinate in organising on-farm demonstrations, and give their feedback to the extension and research. Their representatives are directly involved in the block level Farmer Advisory Committee (FAC) and also the governing board of ATMA. These groups are providing feedback and their needs to FAC and ATMA. The details of FIGs are given in the following table.

Table 3.2.18 Farmers Interest Groups for Various Activities Established under NATP

District	Activities Undertaken	Number of FIGs
Bilaspur	Mahila Mandals and Yuvak Mandals involving mostly village level groups working for overall welfare and development of villages including agriculture and horticulture development activities. FIGs are also involved in different agriculture and animal husbandry activities in the district.	141
Hamirpur	Vegetable Cultivation, Mushroom Cultivation, Agriculture (Mixed Groups), Dairy, Horticulture, Sericulture, Bee Keeping, Post Harvest and Value Addition, Medicinal and Aromatic Plants, Vermicompost, Floriculture, Fisheries and Poultry	203
Kangra	Vegetable Production, Agriculture, Floriculture, Mushroom, Horticulture, Dairy, Sericulture and Fisheries	744
Shimla	Agriculture, Horticulture, Vegetables, Floriculture, Sericulture, Mushrooms, Dairy, Fisheries, Vermicompost, Bee Keeping, Rearing of Poultry, Nursery Raising of Temperate Fruit Crops, Rearing of Sheep, and Post Harvest Technology	656

Source: DoA

The main activities undertaken by FIGs are as follows:

- They are actively involved in identifying needs and location-specific problems and get them included in the block action plan.
- They are involved in forming societies for marketing purpose.
- They purchase and transport the inputs collectively in groups.
- Demonstrations are laid out in FIG fields and the feedback is given to extension and research.

(2) Farmers' Co-operatives under Co-operative Department

In Himachal Pradesh, the co-operative movement started way back in 1892 in Panjavar in Una District. It was an agricultural co-operative society. At present, there are 2086 Primary Agricultural Co-operative Societies as mentioned below.

Table 3.2.19 Primary Agricultural Co-operatives in HP

S.No	District	Number of Primary Agricultural Co-operatives
1	Bilaspur	73
2	Chamba	1,30
3	Hamirpur	217
4	Kangra	597
5	Kinnaur	35
6	Kullu	128
7	Lahaul & Spiti	52
8	Mandi	216
9	Shimla	149
10	Solan	158
11	Sirmaur	119
12	Una	212
Total		2,086

Source: Co-operative Department, Shimla

The major functions of agricultural co-operatives are given below.

- To make arrangements for the distribution of seeds, fertilisers, agriculture implements, insecticides and pesticides, etc., and inputs for agriculture and cottage industry and distribute them amongst the members of the society.
- To ensure sale of produce of the members of society at fair prices.
- To ensure storage facilities by construction or leasing in godowns for safe storage of member farmers' produce.
- To make arrangements for the distribution of credit and recovery of loans, sale of agricultural implements.
- To support activity of fisheries by promoting scientific rearing of fish, make provision for fish ponds and facilitate the marketing of the produce.
- To make provision for upgrading the breeds of milch cattle of the members of the society and liaison with the officials of the Animal Husbandry Department.
- To make provisions for selling of milk and milk products and eggs and poultry products.
- To disseminate agriculture-related innovative ideas and information with the help of Agriculture Department officials to the farmer members of the society.

(3) Self-help Groups (SHGs) Established under Social Welfare and Empowerment

Under the Department of Social Welfare and Empowerment, 17,571 SHGs were formed till March 2007. Out of these SHGs, 11,708 SHGs are linked with banks for micro-credit purposes. These SHGs were involved in a number of activities that also included agriculture activities, vermin-composting, dairy farm activities, etc.

Collectivisation of individuals, commonly referred to as community-based organisations (CBOs), is a popular concept and includes the formation of self-help groups. Himachal Pradesh has a history of women's groups since the colonial period. SHGs were formed in Una District to resolve the perennial water problem in Kandi areas. These groups were called Choe Reclamation (CR) groups. They worked quite well till 1947, after which the Irrigation Department took control over water resource management. From 1947 to about 1990, the state government was involved in every sphere of activities, precluding any voluntary effort. Consequently, community-based organisations were relegated to the background; even the traditional panchayats, instruments of local self-government, fell into disuse; their role arrogated by a powerful, centralised bureaucracy.

The “Devta Committees” (Devali/Harr) in Himachal Pradesh continued to work with curtailed functions. These formal, democratic committees still regulate social customs and functions including protection of forests which are better managed than the government’s “protected forests”.

These SHGs were engaged in natural resource management (land, water and forest), livelihoods, saving and thrift, farming, literacy and health.

In Himachal Pradesh, a significant number of SHGs has been formed under the aegis of the Mahila Mandals. It is one of the programmes implemented by the Himachal Pradesh Corporation for Development of Women (HPCDW). It adopts the SHG approach and functions with the assistance of the International Fund of Agricultural Development (IFAD). The Mahila Mandals programme of Himachal Pradesh was implemented in partnership with NGOs to help disseminate information on SHGs and to provide training and monitor their progress.

The aim of the SHGs, as conceived, was that as groups of individuals, the SHG would address immediate survival and social needs of its members. This could range from health needs to starting a small income-generating initiative. It was also envisaged that from this stage, the SHG would move to larger livelihoods projects. The SHG focused on two aspects: (a) empowering women through a self-help group, and (b) ensuring that their emergency needs are satisfied within that group. The result of which was the promotion of savings and thrift groups. This had to be managed, hence the small size of each group.

SHGs serve the following four purposes:

- Saving and inter loaning for emergency cash needs.
- Bank linkage and bank loan for members’ needs, although they are still not creating income-generating opportunities.
- Some SHGs have achieved enhancement of income.
- Regular interaction of women around economic activity, which helped women enhance their self-respect and consequently, other issues of women’s empowerment.

Thus, whatever the objectives behind the creation of SHGs, these SHGs have contributed to empowering women to some extent. Women’s articulation, negotiation and bargaining skills have been triggered.

Empowerment occurs when the government is prepared to act on the voice of local communities. This would require sustained advocacy to treat rural communities as a key user group, a key stakeholder; because they are the purpose for which the elaborate bureaucracy in the state exists; therefore, mountain people’s institutions must be strengthened. SHGs are yet another mechanism for participatory development, more critically, sustainable development. Sustainable development requires the creation of shared values and priorities between the government, the people and their organisations, and the market.

(4) Water Users’ Association

The Water Users Association (WUA) is another form of CBO. In Himachal Pradesh, there are 1,173 WUAs. The underlying rationale for participation in irrigation is that users have a direct interest in the water delivery function because of its influence on the profitability of their agricultural operations. There is near consensus now that promoting community participation through Water User Associations (WUAs) can be the best strategy for long-term sustainability of irrigated agriculture. WUAs have proven, in the best cases, to be efficient, accountable and responsive.

Considering the importance of women in terms of their numerical strength and the significant contribution they make to the agriculture labour force, it is realised that they should play an important role in the WUAs. However, as the poor status profile and various other factors inhibit their participation, compulsory regulatory means are considered necessary to bring in the desired gender empowerment.

The members of the WUA are primarily farmers and most of them are men, even though Himachal Pradesh has a huge percentage of women working in the fields.

Krishak Vikas Associations (KVA): The farming community has been organised into Krishak Vikas Associations that are operating and maintaining the irrigation system themselves. The ownership of the irrigation systems has been completely transferred to them.

Several government departments have given directives to create SHGs. One of the largest flagship programmes of the GOI under the Ministry of Rural Development is the National Rural Livelihood Mission whose entire basis is developed in mobilising the women from the most vulnerable sections of society.

(5) Lahaul Potato Society (LPS)

In the tough terrain of Lahaul, the transportation of potato was a very challenging task. Due to such condition, traders, middleman and commission agents were exploiting the farmers by quoting very low rates of their produce. To solve this problem, LPS was formed and the farmers have been able to get good marketing facilities and good prices, and exploitation from middleman has been avoided. Initially, its office was opened in Lahaul, but in 1968, the office was shifted to Manali due to bad weather conditions in Lahaul. LPS is the organization registered under cooperative society act.

The major objectives as enshrined in its bylaws are as mentioned below:

- To arrange for the sale of agriculture produce of its members at remunerative prices.
- To provide loans against their produce to the members to meet their immediate requirements.
- To arrange supply of consumer goods to their members at reasonable rates.
- To arrange transportation, grading, bagging and forwarding of their agricultural / horticultural produce to the markets.
- To arrange / supply foundation seed to its grower members.
- To arrange for transportation facilities.
- To arrange lodging facilities to its members at Manali in its guest house at reasonable rates.
- To act as an agent of the state government for the procurement and distribution of agricultural produce as well as essential commodities.
- To promote and set up processing units based on fruits and vegetables.
- To arrange procurement of packing material, spray oil, fertilisers and other inputs for increasing agriculture and horticulture produce and supply the same to members and fruit growers.

The major features of LPS are mentioned below.

- The advantage to farmers is that they just have to bring their produce to the collection centre of LPS. After that, all the grading, packing and marketing are done by LPS. Daily needs items are also supplied to the members of LPS on credit. They have their own retail shops at Manali, Keylong, Kullu and Udaipur, and LPS gives concession to all its members from their retail shops.
- LPS organises camps seasonally for quality potato. The farms are visited by seed certification officers of the government department for 3-4 times in a season.
- The LPS farmers meeting is carried out once in a year. The subjects discussed are profit and loss of LPS activities in a year, and suggestions are also provided by growers.
- Collection location of LPS is at Pandra Mile. The grading, packing and marketing are done by LPS. The gunny bags are used for packing and capacity of gunny bag is 50 kg. Some private traders visit the collection place of LPS, and purchase the potato from the collection place of LPS.
- Potatoes are sent to Chandigarh first and then sent to different parts of the country.

(6) Kullu Fruit Growers Association

The association was established in 1980 with the following objectives:

- To provide fungicides, pesticides/insecticides, quality packaging material to the growers at no profit, no loss (group purchasing).
- To help the farmers to get subsidy under the horticulture technology mission (HTM).
- To organise the camps and trainings for farmers for better quality produce.
- To help the farmers to get crop loan from the banks.
- To help the farmers to get the payment in time from the dealers and commission agents.
- To provide transportation facilities to the farmers at cheaper rate. (Transportation charges are fixed by the association with the transport union).

Extension and research activities: Experts from research stations and from horticulture universities give trainings to the farmers during camps.

Marketing: The association is not involved in the marketing of the growers' produce (fruits and vegetables) due to the different quality of produce. The farmers having orchard at the same place but having different quality of produce demand for the same price most of the times, and therefore, to avoid conflicts, the association does not involve in the marketing of produce from farmers.

Other associations for fruits in Kullu District include Lower Kullu Fruit Growers Association (Bhuntar) and Kullu Sadar Fruit Grower Association (Akhara Bazar).

(7) Exotic Vegetable Farmers Group in Karsog, Mandi District

There are 30 such farmers groups in Karsog, and on average, each group consists of 35-40 farmers. The groups are formed by farmers themselves. The farmers group usually owns collection cum grading centre in which exotic vegetables like lettuce, Chinese cabbage, celery, leek, and broccoli are collected. Other vegetables like red and yellow capsicum, yellow summer squash and peas are also collected. The information surveyed by the Study Team from such groups are mentioned below.

(a) Collection Group - Prakritik

- Collection group name: Prakritik
- This group consists of 100 farmers group and has 5-6 sub-centres in block area.
- This group is formed on 1 April 2008.
- They have 2 A/C vehicles (3-ton type) and 1 vehicle is sent to Delhi daily. The A/C vehicles were purchased by the group with bank support.
- Three tons of produce/day are sent to Delhi daily.
- Packing and grading are done by the farmers themselves.
- They are paying INR 600 per quintal as transportation charges. No member fee is collected.
- Confirmation of present market prices is done by one member of this group in Delhi.
- Group leader also fixes the rates and quantity with the traders and on telephone he asks the group to send the fixed quantity if they are satisfied with the rates.
- On the basis of fixed rates, the money is given to each farmer.
- All the vegetables are sent from March to November.
- Destinations of produce are Okhla Mandi and five-star hotels in Delhi.

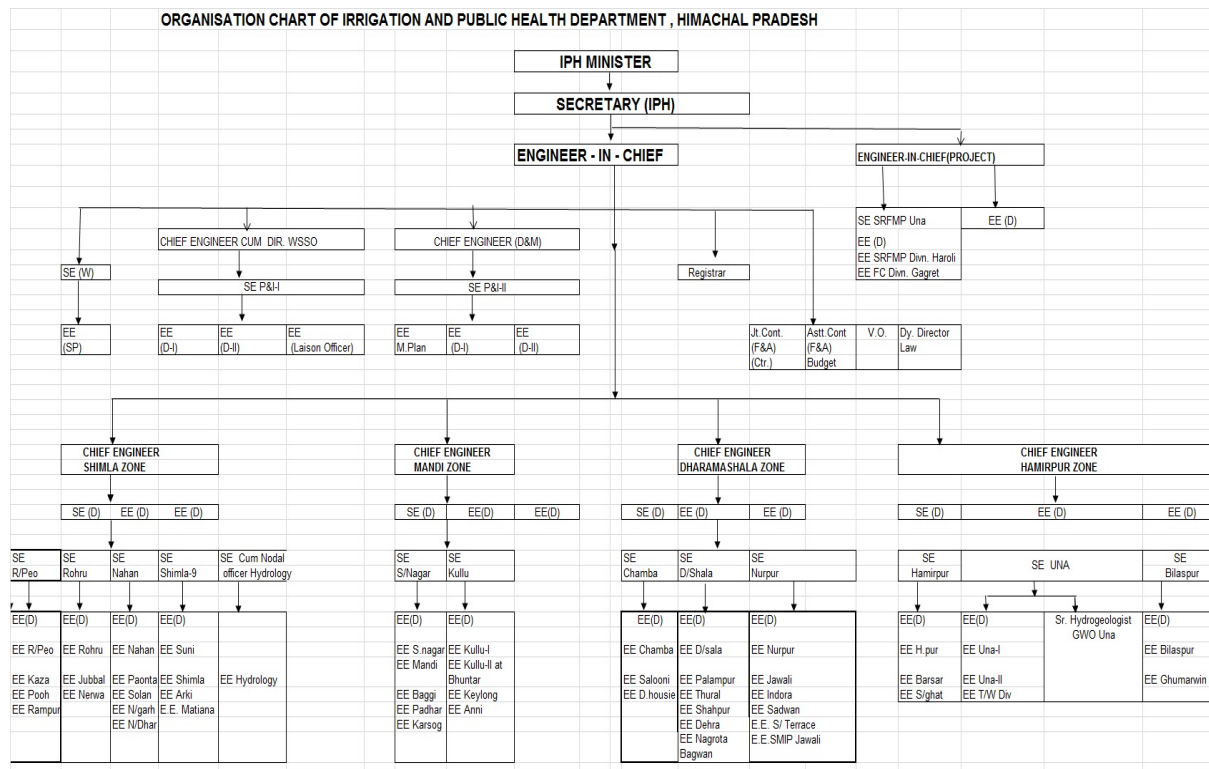
(b) Chaman Pur Kissan Club

- Collection group: It is a group of five sub-groups including Chaman Pur Kissan Group (35 members), Kheel Dharmour Farmer Group (30 members), Maha Maya Farmer Group (30 members), Middle Valley Farmer Group (50 members), and Mahu Nag Farmer Group (100 members).
- Lettuce, Chinese cabbage, ice burg, celery, broccoli, leek, fennel and parsley are sent directly to Delhi and Chandigarh.
- Two tons of produce/day are sent to Delhi directly.
- They also have 2 A/C vehicles (2.5-ton type) on rental basis.
- This group has 4 members in Delhi and 1 member in Chandigarh.
- These members confirm the present market prices and fix the rates and give the same information to their group. The money is paid to each farmer on the basis of fixed rates.
- Seeds required are generally prepared and distributed to farmers by the group leader.
- The produce are sold to the buyers of five-star hotels.
- Transportation charges are collected, but no member fee is collected.
- Destinations are Okhla Mandi, Azadpur, Khan Market, INA Market in Delhi.
- All the vegetables are being sent from April to November.

3.2.9 Irrigation and Public Health Department

(1) Organogram

The organisational chart of the Irrigation and Public Health Department (hereinafter I&PH Department) under the State Government of Himachal Pradesh and the number of engineers in each zone are shown below.



Source: I&PH Department

Figure 3.2.5 Organisational Chart of Irrigation and Public Health Department

Table 3.2.20 Number of Engineers in Each Zone

Zone	Chief Engineer	Superintending Engineer (Design)	Superintending Engineer	Executive Engineer (Design)	Executive Engineer	Total
Shimla Zone	1	1	5	6	17	30
Mandi Zone	1	1	2	4	9	17
Dharamshala Zone	1	1	3	5	15	25
Hamirpur Zone	1	1	3	5	8	18
Total	4	4	13	20	49	90

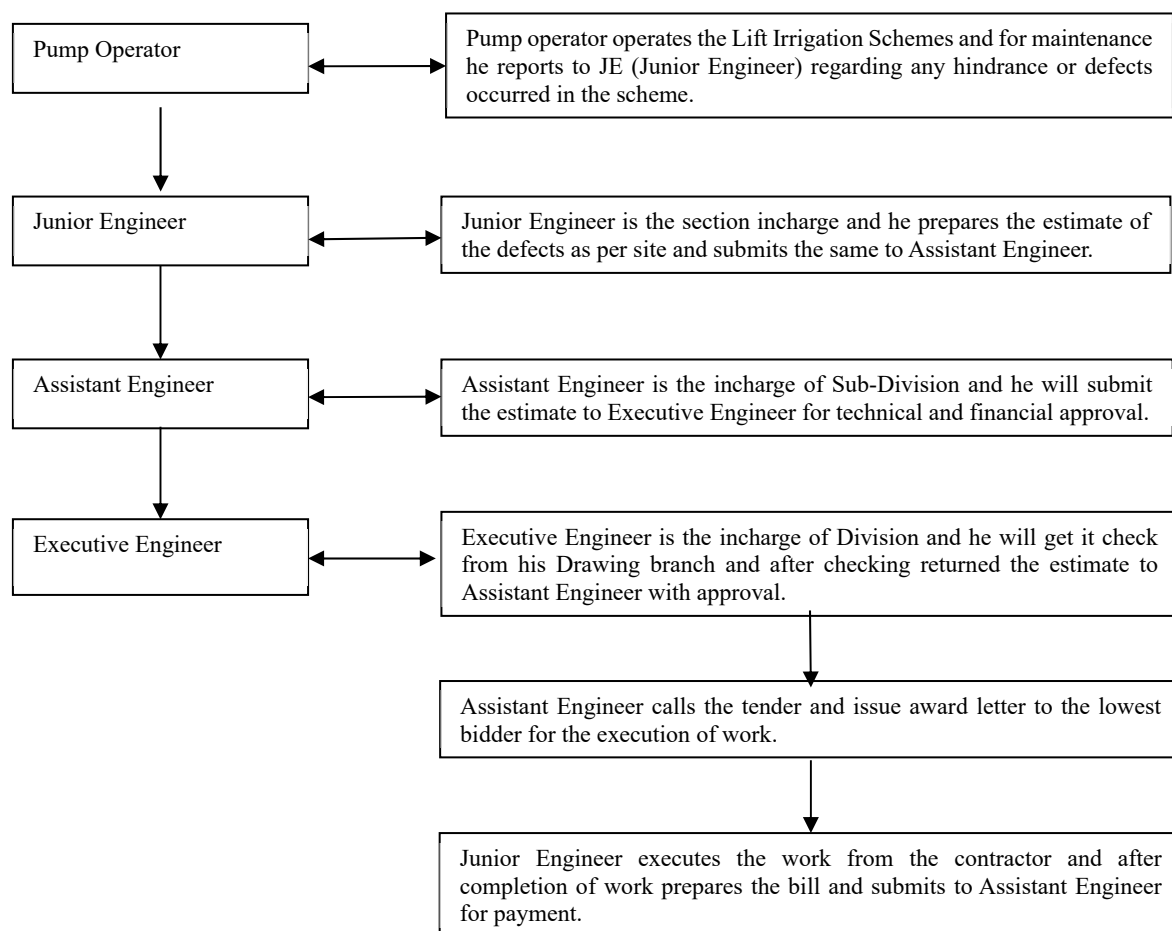
Source: I&PH Department

(2) Jurisdiction of Services

The jurisdiction of the I&PH Department is the construction and management of the following infrastructure:

- Drinking Water Supply
- Sewerage System
- Irrigation Schemes (Flow Irrigation Scheme, Lift Irrigation Scheme, Tube Well Irrigation Scheme, etc.)
- Flood Control Facilities

In terms of irrigation schemes, flow irrigation scheme is handed over to WUAs after construction for O&M. However, lift irrigation scheme is basically maintained by I&PH Department itself based on the protocol shown below.



Source: I&PH Department

Figure 3.2.6 O&M Protocol of I&PH Department for Lift Irrigation Scheme

3.3 Agriculture and Agriculture Production

3.3.1 Local Administration

Himachal Pradesh extends over 55,673 km² in the north western part of India at the foot of the Western Himalayas. The state administratively consists of 12 districts, 78 development blocks, and 3,242 Gram Panchayats, as shown in the table below.

Table 3.3.1 Geographical Area, Development Blocks and Gram Panchayats by District

District	Area	Development Blocks	Gram Panchayats
Bilaspur	1,167 km ² 2%	4	151
Chamba	6,528 km ² 12%	7	283
Hamirpur	1,118 km ² 2%	6	229
Kangra* ¹	5,739 km ² 10%	15	748
Kinnaur	6,401 km ² 11%	3	65
Kullu	5,503 km ² 10%	5	204
Lahaul and Spiti	13,835 km ² 25%	2	41
Mandi	3,950 km ² 7%	10	473
Shimla	5,131 km ² 9%	10	363
Sirmaur	2,825 km ² 5%	6	228
Solan	1,936 km ² 4%	5	211
Una	1,540 km ² 3%	5	234
Total	55,673 km ² 100%	78	3,242

Source: GoHP

3.3.2 Land Tenure

According to the Census of India 2011 and statistical Abstract of H.P. 2018, farm size distribution in the state is presented as follows:

Table 3.3.2 District-wise Land Tenure

District	Marginal	Small	Semi-Medium	Medium	Large	Total
	Below 1.0 ha	1.0 – 2.0 ha	2.0 - 4.0 ha	4.0 - 10.0 ha	Over 10.0 ha	
Bilaspur	17,730	16,608	11,978	4,007	338	50,662
Chamba	23,061	18,552	11,238	1,961	101	54,908
Hamirpur	21,932	20,436	18,970	10,293	1,872	73,502
Kangra ^{*1}	63,810	45,441	44,334	34,587	13,680	201,855
Kinnaur	2,619	3,524	4,200	2,551	1,332	14,227
Kullu	21,897	11,085	6,486	2,048	129	41,643
Lahaul and Spiti	1,004	1,849	2,571	1,140	177	6,743
Mandi	48,611	41,751	28,322	7,831	535	127,051
Shimla	30,971	32,114	31,283	19,704	3,868	117,937
Sirmaur	11,349	15,279	24,023	32,473	16,096	99,221
Solan	12,672	20,954	27,656	20,855	4,485	86,619
Una	17,609	16,349	19,417	19,012	7,897	80,285
Total	273,265	243,942	230,478	156,462	50,510	954,653

Source: Census of India 2011, Statistical Abstract of H.P. 2018-19, GoHP

Table 3.3.3 No. of Farm Households by Size Classes

District	Marginal	Small	Semi-Medium	Medium	Large	Total
	Below 1.0 ha	1.0 – 2.0 ha	2.0 - 4.0 ha	4.0 - 10.0 ha	Over 10.0 ha	
Bilaspur	40,028	12,018	4,576	778	22	57,422
Chamba	51,978	13,876	4,378	390	8	70,630
Hamirpur	52,619	14,452	7,057	1,866	146	76,140
Kangra ^{*1}	180,170	32,691	16,184	6,046	813	235,904
Kinnaur	6,256	2,466	1,522	468	45	10,757
Kullu	63,520	8,106	2,423	385	10	74,444
Lahaul and Spiti	1,838	1,275	929	221	11	4,274
Mandi	111,710	30,301	10,735	1,519	37	154,302
Shimla	71,813	22,808	11,535	3,576	273	110,005
Sirmaur	24,983	10,666	8,583	5,419	1,070	50,721
Solan	24,900	14,528	9,995	3,741	292	53,456
Una	40,610	11,409	6,951	3,197	543	62,710
Total	670,425	174,596	84,868	27,606	3,270	960,765

Source: Census of India 2011, Statistical Abstract of H.P. 2018-19, GoHP

Out of the total farm households of 960,765, marginal and small farm households are 845,021 or 88% of the total farm households in the state.

Together with the implication from the situation of agriculture workers, this indicates that majority of farm households are marginal and small, and their farm income is not sufficient. Therefore, they need off-farm income to supplement farm income, and the marginal cultivators increase. This situation will bring worse situation in the rural economy, and measures to increase farm income are required.

3.3.3 Land Utilisation

According to the land use information of the Department of Land Records, out of the total geographical area of 4,577,742 ha, the forest area legally defined occupies 1,125,386 ha or 25% followed by net areas sown of 547,556 ha or 12%, land for non-agricultural use of 352,407 ha or 8%, cultivable wastes of 121,714 ha or 3%, fallow lands of 77,121 ha or 2%, and land with miscellaneous tree crops not included in cultivation of 66,595 ha or 1% as shown in the following table.

Table 3.3.4 Land Utilisation (in ha)

District	Geographical Area by Village Papers	Forest Land	Misc. Tree Crops & Groves	Pastures & Other Grazing Lands	Cultivable Waste	Land Put to Non-farm Uses	Barren Land	Current Fallow Land	Other Fallow Land	Net Area Sown
Bilaspur	111,776	13,798	129	39,583	5,433	17,184	3,335	1,535	964	29,815
Chamba	692,419	272,008	130	350,882	6,628	13,649	4,854	1,779	625	41,864
Hamirpur	110,224	18,232	0	11,451	12,097	12,473	13,854	5,332	1,944	34,841
Kangra ^{*1}	577,681	231,518	7,474	84,365	27,187	75,084	19,758	14,111	1,384	116,800
Kinnaur	624,199	38,592	230	319,574	3,180	121,856	130,843	1,546	122	8,256
Kullu	65,475	1,627	3,629	7,081	2,210	7,120	2,733	4,155	449	36,471
Lahaul and Spiti	911,195	137,376	111	211,444	568	16,857	541,313	128	1	3,397
Mandi	398,888	178,812	162	94,637	5,409	22,156	2,850	2,406	1,650	90,806
Shimla	525,327	150,349	7,644	235,760	10,735	18,717	12,149	12,289	7,160	70,524
Sirmaur	224,759	48,220	38,306	57,506	13,797	12,971	6,405	5,476	2,010	40,068
Solan	180,945	20,222	1,061	79,319	12,943	13,529	11,236	3,926	2,804	35,905
Una	154,854	14,632	7,719	16,363	21,527	20,811	29,668	3,071	2,254	38,809
Total	4,577,742	1,125,386	66,595	1,507,965	121,714	352,407	778,998	55,754	21,367	547,556

Source : Department of Land Record

3.3.4 District-wise Agro-ecological Zones

Based on GIS data, the cultivated area in each Agro-ecological Zone (AEZ) is estimated in each district and shown as follows:

Table 3.3.5 Land Distribution by Agro-ecological Zone (AEZ)

(Unit: km²)

District	AEZ 1	AEZ 2	AEZ 3	AEZ 4	Total Area
	240 m - 1,000 m in altitude	1,000 m - 1,500 m in altitude	1,500 m - 2,500 m (rainfall < 1,500 mm) 1,500 m - 3,250 m (rainfall > 1,500 mm)	2,500 m & above (rainfall < 700 mm) 3,250 m & above (dry and snow)	
Bilaspur	1,077	77	6	0	1,160
Chamba	288	551	2,897	2,742	6,478
Hamirpur	1,094	18	0	0	1,112
Kangra ^{*1}	3,726	360	672	887	5,645
Kinnaur	0	5	928	5,320	6,253
Kullu	18	289	2,464	2,728	5,499
Lahaul and Spiti	0	0	323	13,699	14,022
Mandi	972	1,277	1,753	8	4,010
Shimla	93	574	3,683	741	5,091
Sirmaur	1,174	892	800	5	2,871
Solan	914	752	212	0	1,878
Una	1,536	1	0	0	1,537
Total	10,892	4,796	13,738	26,130	55,556

Source: Estimation by the Survey Team based on the Agro-ecological Zonation of Himachal Pradesh - Agricultural System Information Development at Micro-level, Geo-Centre, CSK HPAU, Palampur (2020).

3.3.5 Cultivated Area and Production of Food Grains and Vegetable

Cropping season is broadly divided into two major seasons, *kharif* season (rainy season) from June to September and *rabi* season (dry season) from October to May, and the duration varies depending on the

location and altitude. Food grains grown in Himachal Pradesh are maize, rice, millets, ragi (finger millet), pulses, and oilseeds in *kharif* season (June to September), and wheat, barley, gram, pulses, and oilseeds in *rabi* season (November to April), whilst vegetable crops are mostly harvested from April to September. The trend of cultivated area and production of major food grains in Himachal Pradesh is shown as follows:

Table 3.3.6 Trend of Cultivated Area and Production of Food Grains

Major Crops	2015/16		2016/17		2017/18		2018/19		2019/20	
	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)
Paddy	73690	129880	73830	135480	71610	141370	74000	132000	74000	134000
Maize	294220	737650	281340	736460	280810	750910	293000	742000	290000	760000
Wheat	341050	667620	338280	605180	342680	598320	345000	690000	340000	670000
Barley	19230	34330	19490	28660	19160	28190	19500	36000	19500	35300
Pulses	30170	59170	32910	50140	22900	56030	29500	62500	33380	30300

Source: DoA

Total production of food grains is 1,662,500 tons in the state, consisting of 742,000 tons for maize, 690,000 tons for wheat, 132,000 tons for rice and 98,500 tons for other grains. This indicates that maize and wheat are the main food grains in the state.

Table 3.3.7 District-wise Cropped Area and Production of Food Grain Crops

District	Paddy		Maize		Wheat		Barley		Pulses	
	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)
Bilaspur	1,400	2,400	27,000	68,350	25,000	50,000	300	550	1,600	4,530
Chamba	2,150	3,800	26,000	65,800	20,000	40,000	3,000	5,550	2,000	1,950
Hamirpur	2,000	3,500	30,000	76,000	32,000	64,000	300	550	1,600	4,530
Kangra	36,500	65,000	57,400	144,400	94,000	188,000	2,800	5,150	4,600	9,500
Kinnaur	50	90	500	1,300	400	800	1,600	2,950	2,000	4,790
Kullu	1,000	1,700	15,000	38,000	18,500	37,000	2,400	4,450	1,800	1,750
Lahaul-Spiti	0	0	50	150	100	200	300	550	0	0
Mandi	19,200	34,000	47,000	119,000	62,000	124,000	3,000	5,550	3,100	6,000
Shimla	1,700	3,800	15,000	38,000	16,000	32,000	3,200	5,900	3,800	6,650
Sirmaur	4,800	8,450	24,000	60,750	26,700	53,400	1,400	2,600	3,600	7,850
Solan	2,800	5,000	24,200	61,250	21,300	42,600	1,200	2,200	2,900	7,400
Una	2,400	4,260	27,250	69,000	29,000	58,000	0	0	2,500	7,550
Total	74,000	132,000	293,400	742,000	345,000	690,000	19,500	36,000	29,500	62,500

Source: DoA

(1) Major Vegetables

The annual trend of cultivated area and production of major vegetables in Himachal Pradesh is shown as follows:

Table 3.3.8 Trend of Cultivated Area and Production of Vegetables

Major Crops	2015/16		2016/17		2017/18		2018/19		2019/20	
	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)	Area (ha)	Produce (ton)
Potato	18022	183252	21080	202440	15875	198660	14607	186802		
Pea	23574	276359	23965	291039	24370	294964	24607	296760	26257	329911
Tomato	11037	485536	11064	473284	11240	481936	11750	502422	13185	539540
Cauliflower	5270	119010	5341	124917	5564	131009	5917	129577	5924	139139
Cabbage	4905	160744	4852	161108	4903	168249	5283	130333	5480	177883
Garlic	4196	72407	4077	73938	4379	77984	4573	80452	6405	108089
Beans	3687	44689	3761	50019	3818	50865	3893	49916	3749	51149

Okra	2903	38768	3310	45076	3385	45983	3658	46560	3782	52037
Onion	2525	47964	2603	50452	2686	52187	2842	56603	3061	65105
Capsicum	2466	57405	2402	56787	2499	57759	2594	59519	2045	58176

Source: DoA

The district-wise cultivated area and production of major vegetables are shown as follows:

Table 3.3.9 District-wise Cropped Area and Production of Major Vegetables (1/2)

District	Potato		Pea		Tomato		Cauliflower		Cabbage	
	Area	Produce	Area	Produce	Area	Produce	Area	Produce	Area	Produce
	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)
Bilaspur	15	196	185	3,145	865	32,870	171	4,386	55	2,310
Chamba	806	10,412	1,664	23,642	297	11,410	49	1,539	184	5,386
Hamirpur	15	195	113	1,160	88	2,061	608	6,688	53	708
Kangra	990	14,030	940	9,992	336	9,544	595	9,738	715	14,412
Kinnaur	700	9,100	2,600	27,738	76	3,425	78	1,472	128	3,840
Kullu	900	11,520	1,940	29,201	790	31,995	650	13,960	990	33,390
Lahaul-Spiti	650	9,750	3,560	36,189	5	78	839	20,880	57	1,373
Mandi	1,590	18,090	3,655	55,190	997	24,848	828	21,898	1,072	30,756
Shimla	5,750	74,500	6,585	72,776	585	24,095	1,593	38,469	1,628	63,560
Sirmaur	1,500	19,500	1,930	22,284	2,700	113,420	275	4,376	287	10,874
Solan	60	900	1,398	15,145	4,880	244,380	176	5,111	91	3,197
Una	1,431	18,610	37	298	133	4,296	55	1,060	23	527
State	14,407	186,801	24,607	296,760	11,750	502,422	5,917	129,577	5,283	170,333

Source: DoA

Table 3.3.10 District-wise Cropped Area and Production of Major Vegetables (2/2)

District	Garlic		Beans		Okra		Onion		Capsicum	
	Area	Produce	Area	Produce	Area	Produce	Area	Produce	Area	Produce
	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)
Bilaspur	155	2,945	102	1,734	326	5,868	291	6,615	70	2,990
Chamba	108	1,872	315	4,490	129	1,703	112	2,190	19	475
Hamirpur	157	1,805	133	931	711	5,830	279	3,650	26	201
Kangra	384	5,295	325	3,590	1,080	14,666	968	22,450	117	1,495
Kinnaur	13	156	365	3,285	16	185	15	284	27	540
Kullu	1,010	20,200	120	1,200	105	1,313	60	936	85	1,063
Lahaul-Spiti	0	0	15	132	0	0	1	10	8	28
Mandi	486	12,150	656	10,169	420	6,300	498	10,458	267	4,806
Shimla	45	744	788	8,320	105	1,015	85	1,723	300	4,467
Sirmaur	2,020	30,939	497	5,830	220	3,053	232	3,028	443	6,588
Solan	184	4,226	560	10,073	169	2,029	74	1,544	1,214	36,624
Una	10	120	16	162	377	4,598	226	3,715	18	242
Total	4,572	80,452	3,893	49,915	3,658	46,560	2,842	56,603	2,594	59,516

Source: DoA

(2) Comparison of Yields

1) Food grains

The district-wise average yields of major food grains are shown as follows:

Table 3.3.11 Average Yields of Food Grains

(Unit : ton/ha)

District	Paddy	Maize	Wheat	Barley	Pulses
Bilaspur	1.71	2.53	2.00	1.83	2.83
Chamba	1.77	2.53	2.00	1.85	0.98
Hamirpur	1.75	2.53	2.00	1.83	2.83

Kangra	1.78	2.52	2.00	1.84	2.07
Kinnaur	1.80	2.60	2.00	1.84	2.40
Kullu	1.70	2.53	2.00	1.85	0.97
Lahaul-Spiti	-	3.00	2.00	1.83	-
Mandi	1.77	2.53	2.00	1.85	1.94
Shimla	2.24	2.53	2.00	1.84	1.75
Sirmaur	1.76	2.53	2.00	1.86	2.18
Solan	1.79	2.53	2.00	1.83	2.55
Una	1.78	2.53	2.00	-	3.02
State Average	1.78	2.53	2.00	1.85	2.12

Source: Calculated by the Survey Team based on Table 3.3.8.

Since most of the area is grown under rainfed condition, the yield of the food grains is highly influenced by climate, especially rainfall. Maize performs well on well-drained soils and water logging should be avoided. Because of the good drainage conditions in Himachal Pradesh, it is intimated that the average yield of maize is slightly higher than that of the Indian average yield. However, for the other food grains such as paddy and wheat, the average yield is lower than that of the Indian average. The low yield is mainly attributed to the following reasons:

- Cultivation is on the slopes.
- Landholdings are small and scattered.
- The soil is shallow.
- Irrigation is limited.
- Farm mechanisation is scarce.

2) Vegetables

The comparison of vegetable yield in Himachal Pradesh is shown in the following table. In Himachal Pradesh, vegetables are cultivated mostly in assured irrigated areas, and therefore, the yield is higher than the all-India average. Meanwhile, the agro-climatic conditions are also much favourable for cultivating vegetables in the off-season.

District-wise average yields of major vegetables are shown as follows:

Table 3.3.12 Average Yields of Major Vegetables

(Unit: ton/ha)

District	Potato	Pea	Tomato	Cauliflower	Cabbage	Garlic	Beans	Okra	Onion	Capsicum
Bilaspur	13.07	17.00	38.00	25.65	42.00	19.00	17.00	18.00	22.73	42.71
Chamba	12.92	14.21	38.42	31.41	29.27	17.33	14.25	13.20	19.55	25.00
Hamirpur	13.00	10.27	23.42	11.00	13.36	11.50	7.00	8.20	13.08	7.73
Kangra	14.17	10.63	28.40	16.37	20.16	13.79	11.05	13.58	23.19	12.78
Kinnaur	13.00	10.67	45.07	18.87	30.00	12.00	9.00	11.56	18.93	20.00
Kullu	12.80	15.05	40.50	21.48	33.73	20.00	10.00	12.50	15.60	12.51
Lahaul-Spiti	15.00	10.17	15.60	24.89	24.09	-	8.80	-	10.00	3.50
Mandi	11.38	15.10	24.92	26.45	28.69	25.00	15.50	15.00	21.00	18.00
Shimla	12.96	11.05	41.19	24.15	39.04	16.53	10.56	9.67	20.27	14.89
Sirmaur	13.00	11.55	42.01	15.91	37.89	15.32	11.73	13.88	13.05	14.87
Solan	15.00	10.83	50.08	29.04	35.13	22.97	17.99	12.01	20.86	30.17
Una	13.00	8.05	32.30	19.27	22.91	12.00	10.13	12.20	16.44	13.44
State Average	12.97	12.06	42.76	21.90	32.24	17.60	12.82	12.73	19.92	22.94

Source: calculated by the preparatory survey team, based on Table 3.3.11.

Agro-ecological zone-wise recommendable varieties of major vegetables are shown as follows:

Table 3.3.13 Agro-ecological Zone-wise Suitable Varieties of Major Vegetables

Major Crops	Zone-1	Zone-2	Zone-3	Zone-4
Potato	Kufri Chandramukhi Kufri Jyoti Kufri Pukhraj	Kufri Chandramukhi, Kufri Jyoti		Kufri Jyoti
Tomato	Roma, Marglobe, Palam Pink,	Solan Gola, Yashwant (A-2), Roma, Siux,	Him Pragati	

Major Crops	Zone-1	Zone-2	Zone-3	Zone-4
	Palam Pride, Rupali, MTH-15, Naveen, Solan Sagun, Avtar	Solan Braj, Palam Pink, Palam Pride, Rupali, MTH-15, Naveen, Solan Sagun, Solan Garima, Solan Sindhur, Avatar		
Capsicum	California Wonder, Mahabharat	California Wonder, Yellow Wonder, Mahaharat, Solan Sankar-1, Solan Sankar-2	Solan Hybrid-2	
Brinjal	Pusa Purple Long, Pusa Purple Cluster, Pusa Kranti, Hisar Shyamal, Pusa Anupam, T-3, Arka Nidhi, and Arka Keshav	Pusa Purple Long, Pusa Purple Cluster, Pusa Kranti, Hisar Shyamal, Arka Nidhi Arka Keshav		
Okra	Pusa Sawani, Harbhajan, P-8, Tulsi, Palam Komal	Pusa Sawani, Harbhajan,P-8, Tulsi, Palam Komal		
French bean	SVM-1, Premier, Contender, and Kentucky Wonder, Palam Mridula	SVM-1, Premier, Contender, Kentucky Wonder, Luxmi (P-37), VL Bonni-1, Pusa Parvati, Arka Komal, Palam Mridula	SVM-1	
Cucumber	Poinset and K.H-1	Kheera-75, Kheera -90, Poinset, KH-1,	KH-II	
Peas	Bonevilla, Lincoln, V.L.-3, Arkel, V.L.-7, Palam Priya and Matar Ageta	Bonevilla, Kinnauri, Lincoln, VL-3, Palam Priya, GC-477, Panjab 89, Arkel,VL-7, Matar Ageta-6, Solan Nirog	Bonevilla, Kinnauri, Lincoln, Palam Priya, Solan Nirog, Arkel	
Cauliflower	<u>Early Varieties</u> Early Kanwari, Improved Japanese <u>Late varieties</u> Palam Uphar, Pusa Snowball-1, Pusa Snowball K-1	Pusa Snowball-1, Pusa Snowball K-1, Palam Uphar		
Cabbage	Pride of India, Golden Acre	Pride of India, Golden Acre, Pusa Drum Head, Pusa Mukta	Pride of India, Golden Acre, Pusa Drum Head, Pusa Mukta	

Major Crops	Zone-1	Zone-2	Zone-3	Zone-4
Knolkhol (Kholrabi)	Palam Tender Knob Large Green	Large Green, White Vienna, Palam Tender Knob	Large Green, White Viena, Palam Tender Globe	
Turnip	Purple Top White Globe	Purple Top White Globe, Snowball, Pusa Chandrika, Pusa Swarnima	Purple Top Globe, Snowball, Pusa Chandrika, Pusa Swarnima	
Radish	Japanese White, Chinese Pink, Pusa Himani, Palam Hirday	Japanese White, Chinese Pink, Pusa Himani, Palam Hirday	Japanese White, Chinese Pink, White Icicle, Pusa Himani, Palam Hirday	
Carrot	Early Nantes, Chaintni,	Early Nantes, Solan Rachna	Early Nantes, Chaintni, Pusa Yamdagni, Solan Rachna	
Onion	Nasik Lal, N-53, Patna Red, Palam Lohit	Nasik Lal, N-53	N-53, Agrifond Dark Red, Brown Spanish,	
Garlic	Large Segmented, Solan Selection, Selection -1 G.H.C.-1	Large Segmented, Solan Selection, Selection-1, GHC-1	Large Segmented	
Spinach	Banerjee Giant, Pusa Harit	Giant, Virginia Savoy, Pusa Harit	Long Standing, Virginia Savoy,	
Lettuce	Simpson Black Seeded,	Simpson Black Seeded, Alamo-1	Simpson Black Seeded, Alamo-1	
Celery	Utah, Golden Self Blotch	Utah 52-70, Golden Self Blanch	Utah 52-70, Golden Self Blanch	
Broccoli	Palam Haritika, Palam Kanchan, Palam Vichitra	Palam Haritika, Palam Kanchan, Palam Vichitra, Palam Samridhi	Palam Haritika, Palam Kanchan, Palam Vichitra	
Red cabbage	Red Rock, Red Drum Head, Kinner Red	Red Rock, Red Drum Head , Kinner Red	Red Rock, Red Drum Head, Kinner Red	

Source: DoA

3.3.6 Production of Fruit Tree

(1) General

Himachal Pradesh has set up four departments in the agricultural sector, i.e., Departments of Agriculture, Horticulture, Animal Husbandry, and Fisheries. Vegetables are administered by the Department of Agriculture. Horticulture in this annex focuses on fruit crops, floriculture, medicinal and aromatic plants. Himachal Pradesh is suitable for growing a large number of horticulture commodities including temperate to sub-tropical fruit trees, mushrooms, hops, tea, flowers as well as medicinal and aromatic plants. Apart from fruit trees, floriculture is successfully undertaken for off-season supply to the plains.

(2) Growing Area of Fruit Trees

Considering the agro-ecological conditions and the suitability of a particular area for the growth of specific fruit trees in the concerned area, Himachal Pradesh is broadly divided into four agro-climatic zones: (a) low hill and valley areas near the plains; (b) mid hills; (c) high hills and valleys in the interiors; and (d) cold and dry zone. Thus, fruit crops grown in Himachal Pradesh can be grouped into each zone based on the respective crop features as shown below.

Table 3.3.14 Horticulture Zone-wise Suitable Fruit Crops

Zone	Elevation (m)	Rainfall (mm)	Suitable Fruit Trees
Low hill and valley areas near plains (Sub-tropical)	365 – 914	600 – 1,000	Mango, citrus, litchi, loquat, guava, papaya, and low chilling cvs. of peaches and plums
Mid hills (Sub-temperate)	915 – 1,523	900 – 1,000	Stone fruits, pome fruits, walnut, lemon, persimmon, pomegranate, olive, kiwi, strawberry, etc.
High hills and valleys in the interiors (Temperate)	1,524 – 2,742	900 – 1,000	Apple, pear, cherry, strawberry, almond, walnut, chestnut, hazelnut, etc.
Cold and dry zone (Dry temperate)	1,524 – 3,656	240 - 400	Apple, prune, apricot, grapes, almond, walnut, hazelnut, chilgoza, pistachio nut, etc.

Source: DoH

(3) Planted Area and Production of Fruit Trees

The annual trend of cultivated area and production of major fruit trees in Himachal Pradesh are shown as follows:

Table 3.3.15 Trend of Cultivated Area and Production of Major Fruit Trees

Major Crops	2015/16		2016/17		2017/18		2018/19		2019/20	
	Area	Produce	Area	Produce	Area	Produce	Area	Produce	Area	Produce
	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)
Apple	110679	777126	111896	468134	112634	446574	113154	368603	n.a.	715253
Plum	8601	20523	8683	14324	8786	12925	8816	11389	n.a.	14575
Peach	5076	8045	5090	4097	5090	7262	5042	7292	n.a.	8164
Pear	6977	32039	6948	17069	6864	15658	6803	9099	n.a.	16265
Almond	5105	915	4981	701	4923	758	4850	641	n.a.	971
Walnut	4471	2250	4453	2142	4436	2457	4406	2872	n.a.	3144
Orange/ Kinow	8724	13028	8765	14687	8709	14098	8816		n.a.	15676
Mango	41523	37628	41765	48241	41989	31353	42248	43540	n.a.	31879
Litchi	5409	6071	5673	5169	5875	4605	6028	5467	n.a.	4605

Source: DoH

District-wise cultivated area and production of major fruit trees are shown as follows:

Table 3.3.16 District-wise Planted Area and Production of Fruit Trees

District	Apple		Other Temperate Fruit		Mango		Nuts & Others		All Fruits	
	Area	Produce	Area	Produce	Area	Produce	Area	Produce	Area	Produce
	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)
Bilaspur	4	0	751	253	3,652	3,595	1,572	624	5,979	4,472
Chamba	9,853	7,564	1,310	495	424	77	2,324	1,821	13,911	9,957
Hamirpur	0	0	402	323	2,465	941	2,014	1,136	4,881	2,400
Kangra	419	710	1,142	3,809	19,952	46,215	13,820	34,853	35,333	85,587
Kinnaur	7,720	38,066	361	557	0	0	1,235	395	9,316	39,018
Kullu	20,524	141,844	3,061	33,645	79	0	599	136	24,263	175,625
Lahaul- Spiti	533	209	30	25	0	0	7	4	570	238
Mandi	14,567	20,131	5,702	2,557	3,184	610	8,017	976	31,470	24,274
Shimla	29,029	318,449	3,312	3,763	197	44	2,428	639	34,966	322,895
Sirmaur	2,518	560	5,234	7,063	2,812	3,144	4,458	1,979	15,022	12,746
Solan	112	68	2,945	6,036	1,663	1,161	1,621	1,024	6,341	8,289
Una	0	0	977	1,016	1,787	3,952	2,087	1,542	4,851	6,510
State	86,202	527,601	25,227	59,542	36,215	59,739	39,259	45,129	186,903	692,011

Source: DoH

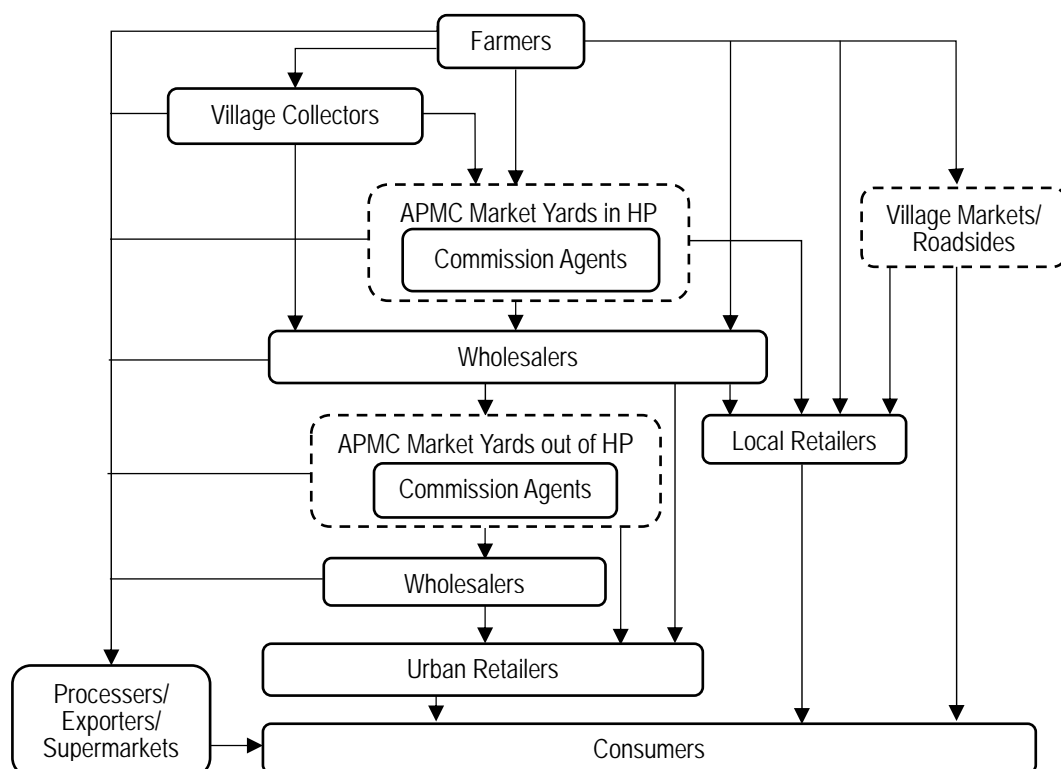
Fruit production is concentrated in the top five districts, i.e., Shimla, Kullu, Kangra, Sirmaur and Mandi, whose share is around 82% of the state's total cultivated area. Kangra District is the top district among the five and its share occupies around 19% of the cultivated area in the state.

3.4 Supply Chain of Vegetables and Fruits in Himachal Pradesh

3.4.1 Overview of the Supply Chain and Challenges

Production of vegetables and fruits, especially vegetables production, has been increasing remarkably in recent years in India. The amount of marketed vegetables and fruits is also increasing accordingly. Production centres of various crops targeting the markets in major cities have developed in various regions in India. A distribution network expanding to several hundred km of marketing area is becoming common nowadays. Thanks to the relatively cool weather in the mountainous area and a closer distance to the Delhi metropolitan area, Himachal Pradesh has been famous for apple production marketed to the metropolitan area for a long time. Vegetables marketed to the metropolitan area mainly during the *kharif* season have also been produced in Himachal Pradesh extensively in recent years, as *kharif* season is the off-season of vegetables in the southern states, which supply a large volume of vegetables to the whole country.

The figure below shows the distribution channels of vegetables and fruits in Himachal Pradesh based on the collected information through the survey.



Source: JICA Survey Team

Figure 3.4.1 Distribution Channels of Vegetables and Fruits in Himachal Pradesh

Whilst it is generally understood that a small percentage of agricultural produce is processed in India, the Ministry of Food Processing and Industries of India has reported that only about 2% of the total production is processed in case of vegetables and fruits. This means that most must be marketed to the end consumers as fresh vegetables and fruits. Vegetables and fruits are becoming important cash crops for farmers along with the development of extensive distribution networks. As discussed below, it is considered that production centres of vegetables and fruits have only been developed in several districts in Himachal Pradesh.

A number of literatures suggest that India has the following challenges to develop a strong supply chain of vegetables and fruits. It is undoubtedly considered that Himachal Pradesh should have similar challenges.

(1) Segmented supply chain

Whilst it is a common issue in India, there are a lot of intermediates in the supply chain. The supply chain involves various kinds and lots of small-scale stakeholders in its multi-layered structure. It is reported that vegetables and fruits must pass 5 - 6 different distribution channels on average, whilst there are more channels reported in some literatures, from the farm gate to the consumer. Consequently, the distribution system is inefficient and has high cost.

(2) Inadequate infrastructures

All related infrastructures, i.e., road networks, sorting and packing facilities, cold storages, logistic facilities, etc. are not well developed. In addition, market information system necessary for optimum use of the infrastructures is still under development. A huge percentage of post-harvest losses including quality deterioration is reported in addition to the inefficiency of the supply chain caused by poor infrastructures.

(3) Lack of technology

Prevalent technologies in the supply chain is still immature. As limited participation of companies with a large capital in the supply chain, investment in introduction and research and development of advanced technologies including development of the infrastructures is weak.

(4) Difficulty in implementing a comprehensive policy

The state governments have not been active in taking measures to facilitate the private sector in developing the supply chain except for managing APMC (Agricultural Produce Marketing Committee) system as discussed below. Establishment of a systematised framework to support the private sector is less advanced in the state governments, as the governments have traditionally focused on regulating the market for protecting farmer interests and preparing the related infrastructures. The governments should establish the framework with non-traditional cross-sectoral structure in the administration including a comprehensive information management system and awareness-raising of the concerned staff to address current issues in the supply chain.

3.4.2 Distribution of Vegetables and Fruits in Himachal Pradesh

JICA Survey Team could not reach to statistical information about distribution of vegetables and fruits in Himachal Pradesh, e.g. supply-demand, distributed amount by major supply channels, etc. except for information in GOI's database of Agmarknet (<https://agmarknet.gov.in/>) about arrival (transacted amount) and price in the markets approved by APMC (*mandis*)³. JICA Survey Team estimated the distributed amount by major supply channels based on collected information from respective APMCs and commission agents (CAs) working in major *mandis* for the second-best solution. The vegetables and fruits selected for the estimation are seven strategic vegetables in the HPCDP I, i.e., cabbage, capsicum, cauliflower, french bean, peas, potato, and tomato, as well as apple, which is an overwhelmingly planted fruit in Himachal Pradesh. The estimation⁴ is summarised in Table 3.4.1. The collected information from APMCs and CAs are attached in the Attachment 3.4.1.

³ The APMC markets are called as "*mandi*" in local language or "market yard" in English

⁴ The estimation should be verified through exchange of opinions with a wide range of concerned personnel and experts, as the estimation is based on collected information through interviews with limited information sources.

Table 3.4.1 Estimated Distributed Amount of Major Vegetables & Fruits in Himachal Pradesh

No	Produce	Total Distribution in HP (ton)				HP Total Production (ton)		
		Coming from		Total	Going to		Ave. 2015/16 - 2019/20	% for sale
		Produced in HP	Other States		Local Markets	Other States		
1	Cabbage	6,999	1,319	8,318	3,488	4,830	148,863	4.7
	(%)	(84.1)	(15.9)	(100.0)	(41.9)	(58.1)	-	-
2	Capsicum	3,182	421	3,603	1,190	2,413	57,929	5.5
	(%)	(88.3)	(11.7)	(100.0)	(33.0)	(67.0)	-	-
3	Cauliflower	15,922	1,540	17,462	5,659	11,803	128,730	12.4
	(%)	(91.2)	(8.8)	(100.0)	(32.4)	(67.6)	-	-
4	French bean	7,136	364	7,500	1,229	6,271	49,328	14.5
	(%)	(95.1)	(4.9)	(100.0)	(16.4)	(83.6)	-	-
5	Peas	14,165	1,439	15,604	5,910	9,694	297,807	4.8
	(%)	(90.8)	(9.2)	(100.0)	(37.9)	(62.1)	-	-
6	Potato	20,193	2,094	22,287	11,266	11,021	192,789	10.5
	(%)	(90.6)	(9.4)	(100.0)	(50.5)	(49.5)	-	-
7	Tomato	41,176	2,238	43,414	9,736	33,678	496,544	8.3
	(%)	(94.8)	(5.2)	(100.0)	(22.4)	(77.6)	-	-
8	Apple	229,602	714	230,316	4,105	226,211	555,138	41.4
	(%)	(99.7)	(0.3)	(100.0)	(1.8)	(98.2)	-	-

Source: JICA Survey Team

As shown in the above table, it is estimated that vegetables produced in Himachal Pradesh are mostly consumed by farmers and neighbour community people. As about 90% of the total population in the state are living in rural areas, most of the produced vegetables are consumed within the areas. It seems that only surplus of the production in the areas is marketed in general. Though a substantial amount of vegetables produced in Himachal Pradesh are marketed to Delhi or other large cities outside of the state, it is estimated that the number of farmers who are engaged in commercial production of vegetables for marketing to the large cities is still limited in the state. In contrast, a large portion of produced apple is marketed as apple is successfully commercialized in the state.

It is estimated that a major part of vegetables marketed in Himachal Pradesh is produced in the state. The percentage of inflow to the total marketed volume is only about 16% in case of cabbage which has relatively a large percentage of inflow among vegetables discussed here. On the other hand, about 60 – 80 % of the vegetables marketed in the state are distributed to other states except for potato. In case of apple, almost marketed volume in the state are distributed to other states. It implies that a production and distribution system of apple is well developed as Himachal Pradesh is famous for apple production in India. The table below shows inflow origins and outflow destinations of major vegetables and apple marketed in the state. While Punjab is the major inflow origin, Delhi and Punjab are the major destinations.

Table 3.4.2 Inflow Origins and Outflow Destinations of Major Vegetables & Fruits in Himachal Pradesh

No	Produce	Inflow Origins	Outflow Destinations
1	Cabbage	Punjab	Punjab, Haryana, Delhi
2	Capsicum	Punjab, Delhi	Delhi, Punjab
3	Cauliflower	Punjab	Delhi, Punjab
4	French Bean	Punjab	Delhi, Punjab
5	Peas	Punjab	Delhi, Punjab, Haryana
6	Potato	Punjab	Delhi, Punjab
7	Tomato	Delhi, Punjab	Delhi, Punjab
8	Apple	Delhi	All over India

Source: HPSAMB

A state of the distribution differs from district to district in Himachal Pradesh, whilst a degree of the area difference is not same among the crops. A percentage of inflow to the total marketed volume is relatively large in Chamba, Hamirpur and Kangra districts (in the western part of the state), whilst a percentage of outflow to the total marketed volume is relatively large in Kulu, Mandi, Shimla, Solan and Sirmour districts (in the central to southern part of the state). Mandi District also records a relatively large percentage of inflow. It seems that Mandi District functions as an important market hub of agricultural produce connecting the production areas and the consuming areas.

Attachment 3.4.2 schematizes a state of market distribution of major vegetables and apple in Himachal Pradesh in terms of estimated volume in percentage by major distribution channels. *Mandis* have a substantial presence in the distribution as it is the largest shipping destination from farmers, as well as the largest shipper to other states. As discussed later, the *mandi* marketing system (APMC market model) has many issues for performing a smooth market operation and the Central Government of India (GOI) has struggled to address the issues for long time. Even though, *mandis* are still playing a major role in vegetables and fruits distribution in the state.

A direct supply is the common practice when farmers (including collective marketing) consign their harvests to *mandis*. It is estimated that presence of village collectors in the transaction is limited in Himachal Pradesh comparing to other developing countries. The same situation is envisaged from an output of interviews to farmers groups carried out in the sample survey in this survey. According to other output of the interviews, farmers acknowledge that local retailers are a major substitutional buyer of them, whilst Attachment 3.4.2 shows a limited percentage of the supply through the farmers-retailers channel in all crops. In case of local distribution within the state in the Attachment 3.4.2, presence of local middlemen in the transaction remains modest, though it is widely recognized that vegetables and fruits are inefficiently distributed through many middlemen in finely segmentalized intermediators in India. These discrepancies should be examined in the further study.

It is estimated that a direct supply, without through *mandi*, from farmers to buyers engaged in an extensive distribution like inter-state traders, supermarket chains, etc. have a certain degree of presence in the distribution. The presence is more significant in the distribution of apple, tomato, potato and peas which are estimated to be marketed to outside of Himachal Pradesh with relatively high volume. However, a direct transaction between farmers and outside retailers, like supermarket chains is still limited in the state, according to many farmers and market players.

3.4.3 APMC Market Model

GOI urged respective state governments to implement Agricultural Produce Marketing Committee Acts (APMC Acts) to protect farmers from greedy intermediaries in the supply chain. Most of the state governments have established their own APMC Act during 1960 – 70. The stated APMC Act aims at regulating, controlling, and monopolising the agricultural market, whilst the contents differ slightly from state to state. All agricultural produce except for national strategic food commodities procured by the government were transacted only in markets approved by APMC or “*mandi*” (market yard) under the APMC Acts. No marketing and processing industries in the agricultural sector could procure raw materials directly from producers. However, wider options for the marketing in addition to *mandi* have been approved by the Model APMC Act 2003.

commodities are basically auctioned at the *mandi* before distribut Operation system of *mandi* is much like the system of Japanese public wholesale markets. Whilst all ion, commission agents (CAs) who are private intermediators located in the *mandi* are mandated to organise a public auction. CAs charge a commission of 5% and a market fee of 1% on a transaction in case of Himachal Pradesh. In this way, CAs operate as a third party in buying and selling, whilst they are engaged in consignment sales by playing a role in mediating the auction. CAs function as a “*niuke*” or a wholesaler in the legal definition in Japanese public wholesale markets.

Himachal Pradesh State has launched its APMC Act in 1969 and the state has established 10 APMCs at the district level. There are 64 *mandis* functioning in the state as shown in the Table 3.4.3. In addition to the functioning *mandis*, there are 11 *mandis* under construction and 15 unperforming *mandis* at present in the whole state. According to the final report of “the Study on Diversified Agriculture for Enhanced Farm Income in the State of Himachal Pradesh” (JICA, 2009), there were 39 *mandis* in the state. The number of *mandis* in the state has increased much in the last 10 years.

Table 3.4.3 Number of APMCs and Mandis in Himachal Pradesh

No	APMC	District (Location of Market Yards)	Number of Market Yards		
			Principal	Sub	Total
1	Bilaspur	Bilaspur	1	3	4
2	Chamba	Chamba	1	0	1
3	HamiRsur	HamiRsur	1	3	4
4	Kangra	Kangra	1	9	10
5	Kullu and Lahaul Spiti	Kullu	1	8	9
6	Mandi	Mandi	1	4	5
7	Shimla and Kinnaur	Shimla & Kinnaur	1	12	13
8	Sirmaur	Sirmaur	1	8	9
9	Solan	Solan	1	4	5
10	Una	Una	1	3	4
Total			10	53	64

Source: JICA Survey Team

It is reported that the APMC market model guided by the intervention of the state governments is not necessarily performing the originally expected roles in protecting farmer interests. Major reasons behind the slumped APMC market model are widely recognised that there are a lot of inefficient and opaque operations in the *mandi* caused by vested interests and cosy relationships amongst stakeholders. However, the fundamental issue of the APMC market model must be that the model has not been able to deal with a dynamic change of agricultural supply chain to the expansion of area and diversification. GOI has implemented various measures to address the issue as discussed in Sub-chapter 3.4.8 “Impacts of COVID-19 and GOI’s Agricultural Market Reform Policy”.

3.4.4 Status of APMC and Mandi

(1) APMC Staffs

The following figure shows the number of APMCs’ staffs in Himachal Pradesh. Whilst the Table 3.4.4 shows a big difference in the numbers from 9 to 30, it is not appropriate to compare the numbers simply between APMCs as the number of *mandis* and the amount of agricultural produce transacted differ from APMC to APMC. The number is less than the sanctioned number except for APMC Sirmaur. The average fulfilment rate is only 83.4%.

Table 3.4.4 Number of APMCs’ Staffs in Himachal Pradesh

No	Position	Bilaspur	Chamba	Hamirpur	Kangra	Kullu and Lahaul & Spiti	Mandi	Shimla & Kinnaur	Sirmaur	Solan	Una
1	Secretary	1	1	1	1	1	1	1	1	1	1
2	Asst. Secretary	0	0	0	1	1	0	0	1	1	0
3	Superintendent	0	0	0	1	1	1	0	0	1	0
4	Market Supervisor	0	1	0	3	0	2	3	1	0	2
5	Senior Assistant	0	0	1	0	0	0	0	0	0	0
6	Auction Recorder	0	0	0	1	1	1	0	0	2	1
7	Assistant Auction Recorder	1	0	2	5	5	5	6	4	5	0
8	Accountant	0	1	1	1	1	1	1	1	0	1
9	Clerk/Typist/Computer Operator	4	2	2	2	3	3	6	2	3	1
10	Driver	0	1	1	2	1	1	1	0	1	0
11	Peon, Sweeper, Night Guard, etc.	4	3	5	11	10	8	12	6	8	5
Total		10	9	13	28	24	23	30	16	22	11
Fulfilment % (Actual/Sanctioned)		83.3	90.0	86.7	90.3	75.0	76.7	78.9	100.0	84.6	84.6

Source: JICA Survey Team

(2) Market Facilities in Mandi

The following figure shows market facilities of *mandis* by APMCs in Himachal Pradesh. Whilst the total number of *mandis* is 64 as mentioned above, several *mandis* which are temporarily operated only during a high harvest season are counted in the number. The Table 3.4.5 shows the state of facilities only in 57 *mandis*.

Table 3.4.5 Facilities in Mandi in Himachal Pradesh

No	Facility	Bilaspur		Chamba		Hamirpur		Kangra		Kullu and L.Spiti		Mandi		Shimla & Kinnaur		Sirmaur		Solan		Una		All	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Number of macker yard	4		1		4		10		7		5		8		9		5		4		57	
2	Total area (m ²)	6,056		2,000		13,129		47,566		74,600		55,000		120,136		51,091		109,550		41,005		520,133	
3	Facilities	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
3-1	Office	2	2	1	0	3	1	10	0	5	2	5	0	6	2	7	2	5	0	4	0	48	9
3-2	Fence	1	3	1	0	0	4	0	10	1	6	2	3	3	5	0	9	2	3	2	2	12	45
3-3	Parking space	3	1	1	0	3	1	10	0	2	5	1	4	6	2	2	7	3	2	4	0	35	22
3-4	Auction shed/hall	2	2	1	0	4	0	3	7	6	1	5	0	7	1	1	8	4	1	2	2	35	22
3-5	Loading platform	0	4	1	0	4	0	0	10	0	7	4	1	5	3	0	9	4	1	2	2	20	37
3-6	Weigh bridge	0	4	0	1	1	3	2	8	1	6	2	3	2	6	1	8	1	4	1	3	11	46
3-7	Shops	4	0	1	0	4	0	10	0	4	3	5	0	8	0	9	0	5	0	4	0	54	3
3-8	Banks/ATM	1	3	0	1	0	4	0	10	1	6	1	4	2	6	1	8	1	4	0	4	7	50
3-9	Storage (Ordinary)	0	4	0	1	0	4	0	10	0	7	0	5	1	7	1	8	4	1	0	4	6	51
3-10	Cold Storage	0	4	0	1	0	4	0	10	0	7	0	5	0	8	0	9	1	4	0	4	1	56
3-11	CA Storage	0	4	0	1	0	4	0	10	0	7	0	5	0	8	0	9	0	5	0	4	0	57
3-12	Farmers' rest house	2	2	1	0	1	3	7	3	3	4	4	1	5	3	3	6	4	1	2	2	32	25
3-13	Canteen	0	4	1	0	0	4	7	3	2	5	3	2	2	6	3	6	3	2	1	3	22	35
3-14	Toilet	4	0	1	0	4	0	10	0	7	0	5	0	6	2	7	2	5	0	4	0	53	4
3-15	Water supply	4	0	1	0	3	1	10	0	7	0	5	0	8	0	8	1	5	0	4	0	55	2
3-16	Electric supply	4	0	1	0	2	2	10	0	7	0	5	0	8	0	1	8	5	0	4	0	47	10

Source: JICA Survey Team

Basic facilities such as office, water and electric supply and toilet are furnished in almost *mandis*. though there are few *mandis* without such basic facilities, which might be a makeshift structure like the temporary *mandis*. The Table 3.4.6 shows that there are a lot of *mandis* without enough facilities necessary for market operation. It is assumed that not a small number of sub-*mandis* (see Table 3.4.3) suffer from the poor market facilities. In addition, the average site area of 57 *mandis* is only 0.9 ha/*mandi*. The site area could be too small to carry out a smooth market operation for many *mandis*, though the seriousness is depending on a transaction volume of each *mandi*.

(3) Equipment in Mandi

The following figure shows the state of major equipment furnished in 57 *mandis* by APMCs in Himachal Pradesh.

Table 3.4.6 Equipment in Mandi in Himachal Pradesh

No	Facility	Bilaspur	Chamba	Hamirpur	Kangra	Kullu and L.Spiti	Mandi	Shimla & Kinnaur	Sirmaur	Solan	Una	All
1	Number of macker yard	4	1	4	10	7	5	8	9	5	4	57
2	Equipment											
2-1	Computer	6	12	6	23	20	22	25	6	23	16	159
2-2	Wi-Fi modem	2	1	1	3	2	4	1	1	1	2	18
2-3	Moisture meter	0	1	1	3	3	2	0	1	2	2	15
2-4	Pressure tester/ Sclerometer	0	1	1	3	0	2	0	1	2	2	12
2-5	Vernier caliper	0	0	0	0	0	2	1	0	1	2	6
2-6	Colorimeter	0	0	0	0	0	2	0	1	1	2	6
2-7	Refractometer	0	1	0	3	0	2	0	0	2	2	10
2-8	LED Boards for rate display	1	0	0	3	0	2	4	2	4	0	16

Source: JICA Survey Team

The total number of all major equipment except for computer is smaller than the number of *mandis*. The figure reveals that the *mandis* have a serious shortage of equipment for quality inspection. There are also limited number of Wi-Fi modems in the *mandis*. It implies that many *mandis* have difficulty in efficient management of market information.

(4) Number of CAs and their Business Activity

The following figure shows the number of CAs (commission agents) in 57 *mandis* by APMCs in Himachal Pradesh.

Table 3.4.7 Number of CAs in Mandi in Himachal Pradesh

No	APMC	Number of Mandis		Number of CAs	Ave. CAs/ Mandi
		Total	Without CAs		
1	Bilaspur	4	2	11	2.8
2	Chamba	1	0	4	4.0
3	Hamirpur	4	1	28	7.0
4	Kangra	10	0	140	14.0
5	Kullu and L.Spiti	7	0	285	40.7
6	Mandi	5	0	145	29.0
7	Shimla & Kinnaur	8	0	281	35.1
8	Sirmaur	9	1	77	8.6
9	Solan	5	0	476	95.2
10	Una	4	0	45	11.3
	All	57	4	1,492	26.2

Source: JICA Survey Team

In total, 1,492 CAs are working in the state. Whilst there are 4 *mandis* without CAs, the average number is 26 CAs/*mandi*. A district recording a higher arrival volume in *mandis* has a higher number of CAs in general. The average number of 26 CAs/*mandi* might be overcrowded, though the situation is depending on a transaction volume of each *mandi*.

The JICA Survey Team made an interview survey to leading 10 CAs introduced by each APMC. The average transaction volume of the CAs was about 1,300 ton/CA in 2019 and the average number of working forces is 10.5 person/CA (including 8.6 employees). The transaction figure implies that most of the CAs do not manage a large size of market operation, although it is expected that APMCs have selected active CAs in their areas. Most of the CAs have only weighing scales for their business operation and only 2 CAs of them have computer sets, according to the interview. It is estimated that almost CAs in Himachal Pradesh are engaged in a small sale of market operation.

The following figure shows business activity of the 10 CAs. Whilst organizing an auction in *mandi* is CA's core business, many CAs are providing market information to farmers. As discussed in Sub-chapter 5.3.4 (2) "Marketing Practice of Farmers", many farmers recognize that CAs are the second popular information source after neighbours. In parallel, not a small number of farmers evaluate that reliability of the information from CAs is not much, though the reliability is higher than that of other traders/middlemen, agricultural extension workers and public information sources. 6 CAs out of the 10 CAs are storing farm produce for a certain period. Few CAs are also providing farmers services for arranging means of transportation, grading/sorting/packing, farm inputs and financing. It implies that there are a certain number of CAs who are expanding their business beyond the *mandi* activity in Himachal Pradesh.

Table 3.4.8 CAs' Business Activity

No	Practiced Service at Present	Yes	No
1	Transporting farm products from farmer to a marketing yard	4	6
2	Organize an auction,	10	0
3	Grading/sorting /packing of products before auction	3	7
4	Storing farm product for a certain period	6	4
5	Processing farm products (dry, juice Puree, jam pickles etc.)	0	10
6	Providing market information to farmers (Price, quality needs, etc.)	8	2
7	Providing technical information to produce crop to farmers	0	10
8	Providing or arranging farm inputs to farmers.	1	9
9	Providing or arranging advance payment for credit to farmers	2	8

Source: JICA Survey Team

The following figure shows issues in business operation raised by the 10 CAs.

Table 3.4.9 Issues in CAs' Business Operation

No.	Issue	Bilaspur	Chamba	Hamirpur	Kangra	Kullu & L. Spiti	Mandi	Shimla & Kinnaur	Sirmour	Solan	Una
1	Small space of market yard (auction/loading/unloading, etc.)			✓				✓			
2	Traffic issues & no parking space							✓			
3	No permanent structure of market yard (tents only)					✓					
4	No gate at entrance of market yard				✓						
5	Poor market infrastructure								✓		
6	Lack of storage space	✓		✓		✓			✓		✓
7	Lack of grading & packaging and processing facilities		✓		✓				✓		
8	No cold store, ripening chamber and processing unit				✓					✓	
9	Lack of market information								✓		
10	Small volume of local produces marketed in market yard		✓	✓							
11	Improper grading of farmers					✓					
12	Late payment or payment default of buyers	✓					✓				✓
13	Credit paymeny from traders (want cash payment)						✓				
14	Lack of financial resources								✓		
15	Stray animals				✓						

Source: JICA Survey Team

The CAs have a wide range of diverse issues. It implies that each CA has different specific issues in running the business. Many CAs indicate issues about lack of storage space (including cold storage facilities) and packing and processing facilities. Both issues concern value addition of farm produce after collection and before marketing from *mandi*. Many market operators indicate a huge percentage of losses in terms of quantity and quality occurred during holding time in *mandi* before and after the action. It implies that CAs also aware the problem. Vegetables and fruits are generally marketed from farmers without sorting, grading and packing. As proper sorting, grading and packing are effective measures to facilitate an ease handling and to prevent transportation losses, CAs are likely to be often proposed to carry out such post-harvest practices by custom traders.

Late payment or default from custom traders is the next serious issue raised by the CAs. According to an interview to them, CAs subsidiarily use a bank transfer or check whilst a cash on delivery is the main payment term in their transactions in both cases of buying and selling. Payment issue from custom traders is a matter of serious concern to CAs.

(5) Quality Standards and Inspection

Establishment of quality standards and a quality inspection system ensuring the effectiveness of the standards is an indispensable requirement for quality control of agricultural produce. According to HPSAMC, vegetables and fruits transacted in the *mandis* are graded customarily by physical appearances, such as size, shape, and colour, without stated quality standards. Only in the case of apple, fruits are mechanically sorted into six grades by diameter size. The National Agriculture Market (eNAM) discloses detailed quality standards of major agricultural products in its website (<https://enam.gov.in/web/commodity/commodity-quality>). Each product on the website is graded into three classes in accordance with the stated quality requirements. The eNAM standards cover 40 kinds of vegetables and 29 kinds of fruits. However, it is reported that eNAM still needs to build a workable system at the field level by facilitating necessary equipment and manpower.

Recently, the regulated ordinance, i.e., “The Himachal Pradesh Agricultural Produce Marketing (Promotion and Facilitation) Ordinance, 2020”, stipulates that HPSAMC is obliged to set up an Agricultural Produce Marketing Standards Bureau to promote the standardisation and quality certification of agricultural produce. In compliance with the ordinance, the Himachal Pradesh State Agricultural Marketing Board (HPSAMB) has already submitted the proposal to the state government to constitute an Agricultural Produce Marketing Standards Bureau at HPSAMB.

(6) Issues in Mandi Management

The following figure shows issues in *mandi* management raised by APMCs in Himachal Pradesh.

Table 3.4.10 Issues in Mandi Management in Himachal Pradesh

No	Issues & Challenges	Bilaspur	Chamba	Hamirpur	Kangra	Kulu and L. Spiti	Mandi	Shimla & Kinnaur	Simnaur	Solan	Una
1	Small space for market operation			✓		✓	✓	✓			✓
2	No lading and unloading area						✓				
3	No/less parking area				✓		✓	✓			
4	Traffic jam			✓				✓			✓
5	Poor road facility							✓			
6	No/poor building facilities	✓									
7	No auction platform	✓					✓			✓	
8	No storage/cold storage facilities	✓	✓	✓	✓	✓			✓	✓	
9	No grading & packing unit		✓	✓	✓	✓				✓	
10	No loading platform facility				✓						
11	Waste management					✓					
12	No Bbank/ATM facility									✓	
13	Low inflow of local produces	✓	✓		✓				✓	✓	✓
14	Non-operated Mandi			✓							
15	No/less CAs				✓						
16	No/less shops			✓							
17	Timely availability of tracks								✓		

Source: JICA Survey Team

APMCs are concerned much about issues of lack of storage space (including cold storage facilities) and packing and processing facilities, as same as CAs. A cautious attention should be paid to the operation and management and the cost burden sharing when furnishing the storages and facilities to *mandis*, as not a small amount of additional operation costs is expected for a proper operation of them. The primary beneficiary of such storages and facilities are CAs though farmers could be an indirect beneficiary of them. A transparent and fair management system with the beneficiaries-pay principle, e.g. a joint operation of CAs, should be established in parallel with the facility development.

Many APMCs recognize a low inflow of local produce to *mandis* as a serious issue. Whilst followings might be common causes of the low inflow, seriousness of each cause differs from place to place and the causes correlate each other in most cases. Optimum countermeasures shall be taken for each *mandi* after analysis of the causes and the correlation.

- Stagnant local production
- Excess number of CAs and *mandis* considering the local production
- High volume of distribution flow through non-*mandi* canals due to poor management of *mandis* (many producers and custom traders are not satisfied with services provided)

Another serious issue recognized by APMCs must be a small space of *mandis*. Issues of no parking area and traffic jam are causally related to the issue. According to HPSAMB, not a small number of *mandis* have difficulty in upgrading of market facilities due to lack of the site space.

As discussed above, an investment level even for basic market facilities remains low in many *mandis* in Himachal Pradesh. Then, it is estimated than the low investment should hamper a smooth market transaction in the *mandis*. The issue should be promptly addressed by appropriate measures to enhance the whole distribution system of vegetables and fruits in the state. In addition, many *mandis* are burdened with difficulty in expanding and modernizing its market facilities due to lack of the site space. Whilst opening of new *mandis* are still progressing in the state by a policy placing emphasis on farmers' accessibility to a *mandi*, many of them might be placed in an area where is available only small quantities of marketed vegetables and fruits. Now is the right time to contemplate a plan to merge and abolish the existing *mandis* under a strategy of selection and concentration in accordance with a master plan which shall be prepared after examining reality and vision of vegetables and fruits marketing in Himachal Pradesh.

In addition to the facility development, a proper management must be the other important factor in enhancing *mandis* so that they will be able to exert an expected performance. As reported in many literatures, farmers and market players have expressed their doubt and complaint about CAs' performance. They have suspicious about fairness of auction organized by CAs. It is also reported that

CAs in many *mandis* conventionally collect ambiguous charges other than their commission fixed by the APMC Act. The problems could be mainly caused by CAs' capability for a business operator, as well as by their weak business operation base.

As CAs are main player in operating *mandis*, it is not too much to say that the ebb and flow of *mandis* are depending on the quality of services to farmers and market players provided by CAs. In parallel with the development of *mand* facilities, CAs must be empowered as a business operator of vegetables and fruits trading in terms of many aspects.

3.4.5 Arrival of Vegetables and Fruits in APMC Market Yards

The arrival of selected vegetables and fruits in the *mandis* by districts (APMC areas) in Himachal Pradesh is discussed based on GOI's database of Agmaknet. The vegetables and fruits selected for the analysis are the 8 crops discussed in sub-chapter 3.4.2 "Distribution of Vegetables and Fruits in Himachal Pradesh" and promising vegetables in the state, i.e. garlic, okra and onion. As shown in Table 3.4.3, an independent APMC is not established in Kinnaur District and Lahaul & Spiti District. The APMCs in Kulu District and in Shimla have jurisdiction over Kinnaur District and Lahaul & Spiti District, respectively. This situation implies that limited amounts of vegetables and fruits are marketed in Kinnaur District and Lahaul & Spiti District.

The HPSAMB estimates that about 50% of marketed vegetables and fruits are transacted in *mandis* in Himachal Pradesh. According to the collected information from APMCs, 60-70% of the vegetables and apples marketed are likely to be transacted in the *mandis* in Himachal Pradesh (see Attachment 3.4.2) .

The Table 3.4.11 shows the average share (Year 2015-19) of marketed amount of the selected produce through the *mandis* by districts (APMC areas). Whilst Agmarknet does not have any information for Kinnaur District and Lahaul & Spiti District, it is considered that the information of both districts would be calculated from the information of Kulu District and Shimla District, respectively.

Table 3.4.11 Share of Transacted Volume of Selected Produce in the *Mandis* by Districts in Himachal Pradesh (Average: 2015~19)

District	Produce (%)							
	Cabbage	Capsicum	Cauliflower	French Bean	Peas	Potato	Tomato	Apple
Bilaspur	1.4	2.4	1.1	0.1	0.0	3.7	0.5	0.0
Chamba	3.7	1.2	1.3	0.3	0.0	4.5	1.1	0.0
Hamirpur	2.6	2.3	1.8	0.6	1.5	6.2	1.4	0.1
Kangra	15.3	12.0	5.8	4.5	7.5	10.0	4.6	0.5
Kullu	11.2	5.4	29.0	2.5	17.5	7.9	12.7	20.5
Mandi	18.9	10.3	20.5	4.4	25.8	14.8	18.2	2.3
Shimla	34.8	15.9	28.7	64.7	44.6	11.0	2.7	44.5
Sirmaur	0.6	0.9	0.8	0.2	0.3	3.1	4.8	0.0
Solan	8.0	45.5	6.0	18.2	0.0	20.8	51.6	31.9
Una	3.4	4.1	5.1	4.6	2.8	17.9	2.5	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: JICA Survey Team

Whilst Attachment 3.4.3 shows detailed discussion, the tables in Attachment 3.4.3 show that the transacted volume of the selected produce is relatively large in Shimla and Solan districts followed by Kangra, Kulu and Mandi districts. The five districts keep 65-95% of the total share for all selected produce. According to the collected information from APMCs in the districts except for Kangra, it is estimated that 70-80% of transacted amount of the selected produce in the *mandis* are marketed to other states. This implies that the development of production centres of the produce marketed to large cities like Delhi has progressed in the four districts, and the *mandis* in the districts are functioning as a market hub for inter-state distribution.

The tables in Attachment 3.4.3 show that the transacted volume of the selected produce is relatively large in Shimla and Solan districts followed by Kullu and Mandi districts. The four districts have 70-90% of the total share except for potato. According to the collected information from APMCs in the four districts, it is estimated that 70-80% of transacted amount of the selected produce in the *mandis* are marketed to other states. This implies that the development of production centres of the produce

marketed to large cities like Delhi has progressed in the four districts, and *mandis* in the four districts are functioning as a market hub for inter-state distribution.

Although Kangra District has a relatively high percentage of the share, the major part of the transacted produce in the *mandis* in the district goes to the local markets including neighbour districts, according to the information from APMC Kangra. *Mandis* located in the districts in the eastern part of Himachal Pradesh, i.e., Bilaspur, Chamba, Hamirpur, Una and Kangra, are functioning as a market for intra-state distribution including the inflow from neighbour states.

3.4.6 Market Price of Vegetables and Fruits in APMC Market Yards

Market prices of the selected vegetables and fruits in the *mandis* by districts in Himachal Pradesh are discussed below based on GOI's database of Agmaknet, whilst detailed discussion for each produce is made in Attachment 3.4.3. Different from the arrival discussed above, all districts in Himachal Pradesh have a similar trend in the monthly price change. Whilst a major part of vegetables and fruits consumed in the state are supplied by local farmers, it is estimated that the total marketed amount remains only a small part of the total production in the state in case of vegetables (see Table 3.4.1). Therefore, the market price likely to be influenced much by overall local production trend. It is considered that the market price of many vegetables is much influenced by the popular local cropping season. The price basically tends to increase during the off-season to the beginning of the harvesting season and to decrease during the peak harvesting season (negative correlation between the monthly production and the price). However, the price trend cannot be applied to vegetables which are actively marketed to out of the state, as the vegetables are widely grown in unpopular local cropping season in some districts.

It is interesting that districts with production centres of the selected produce to be marketed to large cities have generally recorded a lower price than the price in the other districts during the high price season in the state. This implies that the price for inter-state distribution is lower than the price for intra-state distribution during the season due to a strong influence of market price in major consuming areas.

The selected vegetables and apple discussed are largely categorised into the following three groups based on relationship between the monthly arrival and price in the *mandis* in the state.

- i) Positive correlation between the monthly arrival and the price (cabbage, capsicum, cauliflower, french bean, peas and tomato)
These crops have recorded a high monthly arrival in districts with a higher annual arrival during the low arrival season (the low-harvest & high-price season) in other districts. The season is also a lean supply season of the crops from production centres in other states to major consuming cities in neighbour states like Delhi. Consequently, the arrival trend in the state represents the trends of the former districts. However, the arrival is only a limited part of the total harvested amount in the state. As a result, the price trend is largely influenced by the trends of all districts and the trends of the consuming cities. It implies that farmers in the former districts grow much such vegetables by controlling a peak harvesting season so that they can enjoy a good price of the crops to be marketed to the consuming cities.
- ii) Negative correlation between the monthly arrival and the price (garlic, okra, onion and apple)
These crops have recorded a similar arrival trend in all districts. It is estimated that marketing of garlic, okra and onion to the consuming cities by controlling the harvesting season are still not popular in the state due to several reasons, e.g. nature of the crop (local adoptability and growing season), local cropping system (combination with other crops), possible farming technology (controlling the growing season), etc. Also, not a small percentage of local demand of the crops are likely to be supplemented by the inflow from other states.
In case of apple, it is almost impossible to control its harvesting season as it is a perennial tree crop, not like vegetables.
- iii) Little or no correlation between the monthly arrival and the price (potato)
As potato is likely a kind of staple foods for many people, it has a steady demand throughout the year relatively regardless of the price. Potato has a steady supply throughout the year as well, due to its wide adoptability to growing condition.

3.4.7 Transaction in Azadpur Market and its Influence on Himachal Pradesh Market

The Azadpur Market located in Delhi is a leading *mandi* (APMC market) in the country supplying vegetables and fruits to the capital region with a huge number of consumers. It has a close network with

many production areas of various kinds of vegetables and fruits in the whole country including Himachal Pradesh. A nationwide distribution network of vegetables and fruits mainly centred in the Delhi metropolitan area has gradually began to function in the late 1980s. Then, the network especially for vegetables connecting many cities with many production centres has spread over the whole country in the early 2000s. It is reported that a lot of large production centres connected with a large consumption area have been developed whilst small and medium production centres have consequently shaken out during the period.

The arrival and price in Azadpur *Mandi* of the selected produce⁵ analysed in the above sub-chapters are discussed below based on the information in 2015-19 from GOI's database of Agmarknet. The result implies that the production centres in Himachal Pradesh have a close connection with Azadpur *Mandi* (refer Attachment 3.4.4 for details). As shown in the Table 3.4.12, many vegetables, e.g. cabbage, capsicum, cauliflower, peas and tomato are likely to be grown in the state by controlling the harvesting time so that the vegetables can be marketed to Azadpur *Mandi* during its lean arrival season (high price season).

Table 3.4.12 Correlation between Arrival of *Mandis* in Himachal Pradesh and Price in Anandpur Market

No	Produce	Month		Correlation
		Peak Arrival in HP	High Price in Azadpur	
1	Cabbage	Jul - Aug & Oct	Aug - Nov	Yes
2	Capsicum	Jul - Aug	Feb - Mar & Jul - Oct	Yes
3	Cauliflower	May - Aug	Jul - Oct	Yes
4	Okra	May - Sep	Dec - Apr	No
5	Onion	May - Jun	Aug - Nov	No
6	Pea	Apr - Jun & Oct	Jul - Nov	Yes
7	Potato	May	Jun - Nov	No
8	Tomato	Jul - Sep	Jul - Nov	Yes
9	Apple	Aug - Oct	Mar - Jun	No

Source: JICA Survey Team

Table 3.4.2 implies that Delhi is the most important destination for vegetables and fruits marketed from Himachal Pradesh. Azadpur *Mandi* could not share a time to supply sufficient information necessary for quantitative analysis of a market linkage of vegetables and fruits between Himachal Pradesh and Azadpur *Mandi* due to a load of struggles with COVID-19. Table 3.4.13 shows arrival of Azadpur *Mandi* and that of all *mandis* in Himachal Pradesh for comparison. As shown in Figure 3.4.1, all arrival of the *mandis* in Himachal Pradesh are not distributed to Azadpur *Mandi*, whilst other alternative channels are existing in the distribution from Himachal Pradesh to Azadpur *Mandi*. Therefore, a simple comparison of the arrivals is not appropriate to show an accurate picture of the market linkage between Himachal Pradesh and Azadpur *Mandi*. The Table 3.4.13 only provide a rough panoramic view of the linkage.

Table 3.4.13 Arrivals of Azadpur *Mandi* and all *Mandis* in Himachal Pradesh (Average: 2015~19)

No	Produce	A: Azadpur (ton)	B: All <i>Mandis</i> in HP	
			(ton)	B/A (%)
1	Cabbage	43,556	5,995	13.8
2	Capsicum	37,580	2,797	7.4
3	Cauliflower	53,613	13,499	25.2
4	Okra	26,460	1,689	6.4
5	Onion	283,888	6,140	2.2
6	Peas	35,112	9,694	27.6
7	Potato	369,645	10,558	2.9
8	Tomato	146,296	27,204	18.6
9	Apple	523,489	128,794	24.6

Source: <https://agmarknet.gov.in/>

Given that 1/3 – 1/2 of arrival of all *mandis* in Himachal Pradesh are channelled to Azadpur *Mandi*, cauliflower, peas, tomato and apple produced in Himachal Pradesh may keep a certain degree of

⁵ Related information of french bean and garlic is not available in Agmarknet.

influential market position in Azadpur *Mandi*, whilst other vegetables likely to have only several percentages of the market share. Population growth and urbanization and dietary changes (increased consumption of vegetables and fruits) associated with the economic growth in India could allow a continuous and dynamic expansion of Azadpur *Mandi*. On another front, an intense competition among production centres supplying the produce to the Delhi market should continue as a lot of the production centres are emerging in the whole country. Crop diversification in Himachal Pradesh shall be progressed under a strategy consolidating the state's foothold in the market of cauliflower, peas, tomato and apple, as well as developing a market of new crops with taking climatic and geographical advantages of the state.

3.4.8 eNAM (National Agriculture Market)

eNAM is a platform for e-trading of agricultural produce aiming at networking APMC markets (*mandis*) in the whole country to develop a nationwide agricultural market. The ultimate goals are providing adequate choices of marketing to farmers and reducing transaction costs through streamlined distribution channels in the supply chain. eNAM was launched in April 2016 under the strong direction of the Prime Minister. The Small Farmers Business Consortium (SFAC) is the lead agency for the implementation under the aegis of the Ministry of Agriculture and Farmers' Welfare.

In Himachal Pradesh, there are 19 *mandis* connected with the eNAM portal at present. Two *mandis* namely, Dhalli (Shimla) and Solan, were chosen as the pilot *mandis* for eNAM. Subsequently, five more *mandis* and thereafter 12 *mandis* were integrated with the eNAM portal in a phased manner (see the following Table 3.4.14).

Table 3.4.14 eNAM Mandis in Himachal Pradesh

No	Pilot	1st Phase (2016)	2nd Phase (2017)
1	Dhalli (Shimla)	Bhatakuffar (Shimla)	Parala (Shimla)
2	Solan (Solan)	Parwanoo (Solan)	Rohru (Shimla)
3	-	Jassur (Kangra)	Bandrol (Kullu)
4	-	Takoli (<i>Mandi</i>)	Patlikuhal (Kullu)
5	-	Bhuntar (Kullu)	Kangra (Kangra)
6	-	-	Palampur (Kangra)
7	-	-	Paonta Sahib (Sirmaur)
8	-	-	Hamirpur (Hamirpur)
9	-	-	<i>Mandi (Mandi)</i>
10	-	-	Chamba (Chamba)
11	-	-	Una (Una)
12	-	-	Santokgarh (Una)

Source: HPSAMB

The following figure shows the typical procedure of eNAM transaction practiced in the *mandis*:



Source: JICA Survey Team

Figure 3.4.2 eNAM Transaction Procedure in Mandis

According to the collected information from the *mandis* in Himachal Pradesh, the farmers and market players have a complaint about eNAM operation as described below. Consequently, they continue to have a limited awareness about eNAM trading. There are a lot of issues to be addressed at the field level, although the promotion of e-trading of agricultural produce is an expected centrepiece of GOI's agricultural market reform policy.

- Poor communication environment (low speed or no response)
- Immature operation system (low user-friendliness)
- Lack of e-communication equipment (computer, printer, scanner, etc.)
- Lack of manpower (data input and system maintenance)
- Lack of equipment for weighing and quality inspection
- Invisible buyers
- Late payment to farmers (2-3 days necessary through the on-going payment system, whilst

- farmers need cash on delivery)
- Small lot of farm produce (not attractive to bulk purchasers)

Whilst there are serious issues in the operation system of eNAM including deployment of necessary equipment and manpower, only APMCs cannot address the issues on bill settlement and lot size. GOI and state governments need a steady and long-term approach to overcome the issues through institutional reforms and awareness-raising for all stakeholders including farmers.

3.4.9 Value Change and Farmers' Income

(1) Value Change of Vegetables and Fruits

Value change analysis of vegetables and fruits during the distribution can be theoretically made in accordance with changes in the price and the loss. However, related information compiled through a systematic analysis is not available from agencies concerned in Himachal Pradesh. Probably, a periodical market survey collecting the information has not been made by local administration. In the second-best way, possible related information was collected through interviews with all APMCs and CAs in major *mandis* in the state. It is noted that the information may have less accuracy as collected figures are based on a general estimation from their field experience.

(a) Price Changes

The following figure shows price changes of vegetables and fruits during the distribution based on the estimation of APMCs and CAs.

Table 3.4.15 Estimated Price Changes of Vegetables and Fruits During the Distribution

No	Produce	Farmers/ Village Collectors	CAs	Inter-state Traders	CAs in other States	Middlemen	Retailers	Total Margin
1	Cabbage	76.6	82.6	85.9	89.8	95.0	100.0	-
	Margin (%)	-	6.0	3.3	3.9	5.2	5.0	23.4
2	Capsicum	73.8	80.4	84.3	87.7	92.6	100.0	-
	Margin (%)	-	6.6	3.9	3.4	4.9	7.4	26.2
3	Cauliflower	69.8	77.3	84.1	87.8	92.2	100.0	-
	Margin (%)	-	7.5	6.8	3.7	4.4	7.8	30.2
4	French Bean	69.8	77.3	84.1	87.8	92.2	100	-
	Margin (%)	-	7.5	6.8	3.7	4.4	7.8	30.2
5	Peas	69.1	77.5	83.4	87.2	92.2	100.0	-
	Margin (%)	-	8.4	5.9	3.8	5.0	7.8	30.9
6	Potato	69.4	76.0	83.7	86.8	92.4	100.0	-
	Margin (%)	-	6.6	7.7	3.1	5.6	7.6	30.6
7	Tomato	70.6	75.9	82.0	86.0	90.6	100.0	-
	Margin (%)	-	5.3	6.1	4.0	4.6	9.4	29.4
8	Apple	63.6	70.2	76.7	81.7	89	100	-
	Margin (%)	-	6.6	6.5	5.0	7.3	11.0	36.4

Source: Reply to Questionnaire, APMCs & CAs, Aug. 2020

The figure in the Table 3.4.15 is quite different from common figure perceived in many literatures on agricultural marketing. The literatures have reported that agricultural marketing system in India is inefficient due to many intermediate agents from producers to consumers. And they generally indicate that distribution margin of middlemen/traders is 5 – 10 % and the margin of retailers is 10 – 15%, then producers consequently get only 30 – 35% of the retail price. In case of Japan as shown in Table 3.4.16 though a simple comparison is not appropriate, the distribution margin in each step is higher than the margin in Table 3.4.15. Especially, the retailers' margin in Table 3.4.16 is much higher.

Table 3.4.16 Distribution Margin of Vegetables and Fruits in Japan

No	Produce	Producers	Marketing Groups (Cooperatives)	Market Yards (CAs)	Middlemen	Retailers	Total Margin
1	Cabbage	51.8	71.4	77.3	85.7	100	-
	Margin (%)	-	19.6	5.9	8.4	14.3	48.2
2	Capsicum	51.6	60.6	65.7	77.2	100	-
	Margin (%)	-	9.0	5.1	11.5	22.8	48.4
3	Potato	39.5	55.6	59.6	76.1	100	-
	Margin (%)	-	16.1	4.0	16.5	23.9	60.5

4	Tomato	48.3	65.2	71.5	81.0	100	-
	Margin (%)	-	16.9	6.3	9.5	19.0	51.7
5	Apple	45.6	67.5	70	78.3	100	-
	Margin (%)	-	21.9	2.5	8.3	21.7	54.4

Note: Margin of marketing groups contains necessary costs for sorting & packing including packing material costs
Source: Report on Food Prices Survey 2017, the Ministry of Agriculture, Forestry and Fisheries Japan

The distribution margins in India have been possibly lower than those in Japan because of strong competition among a lot of intermediate agents in many segmented stages. However, about 30% of the total margin as shown in Table 3.4.15 can only be evaluated that the figure is unreliable estimations. The estimation should be assessed by various aspects through many discussions with diverse market players and experts in Himachal Pradesh.

(b) Losses

The following figure shows losses of vegetables and fruits during the distribution based on the estimation of APMCs and CAs.

Table 3.4.17 Estimated Losses of Vegetables and Fruits During the Distribution

No	Produce	Farmers/ Village Collectors	CAs	Inter-state Traders	CAs in other States	Middlemen	Retailers	Total Losses
1	Cabbage	100.0	96.7	94.0	90.4	86.8	81.8	-
	Margin (%)	-	3.3	2.7	3.6	3.6	5.0	18.2
2	Capsicum	100.0	96.8	94.7	90.6	86.1	82.2	-
	Margin (%)	-	3.2	2.1	4.1	4.5	3.9	17.8
3	Cauliflower	100.0	96.5	93.4	90.0	86.7	82.3	-
	Margin (%)	-	3.5	3.1	3.4	3.3	4.4	17.7
4	French Bean	100.0	97.1	94.3	91.0	88.3	83.4	-
	Margin (%)	-	2.9	2.8	3.3	2.7	4.9	16.6
5	Peas	100.0	95.7	91.3	88.1	84.8	80.1	-
	Margin (%)	-	4.3	4.4	3.2	3.3	4.7	19.9
6	Potato	100.0	98.3	96.5	93.4	90.2	86.8	-
	Margin (%)	-	1.7	1.8	3.1	3.2	3.4	13.2
7	Tomato	100.0	96.8	91.8	87.8	84.1	79.4	-
	Margin (%)	-	3.2	5.0	4.0	3.7	4.7	20.6
8	Apple	100.0	97.3	94.1	90.8	87.6	83.6	-
	Margin (%)	-	2.7	3.2	3.3	3.2	4.0	16.4

Source: Reply to Questionnaire, APMCs & CAs, Aug. 2020

Many literatures have reported that quantitative and qualitative losses of vegetables and fruits during the distribution is relatively high in India. The total losses are commonly perceived at about 40%. Whilst “Global Food Losses and Food Waste, 2011” of FAO estimated food losses in the world by regions including the losses in the South and South-eastern Asia Region as shown in Table 3.4.18. Though the losses in the region does not represent the losses in India, the losses in the supply chain (excluded the losses in agricultural production and consumption) is estimated at 44% which is not much different from about 40% of the commonly perceived losses in India.

Table 3.4.18 Losses of Vegetables and Fruits in the World by Regions (%)

No	Region	Agricultural Production	Post-harvest Handling & Storage	Processing & Packing	Distribution	Consumption	Total (Supply Chain only)
1	Europe & Russia	20	5	2	10	19	56 (17)
2	N America & Oceania	20	4	2	12	28	66 (18)
3	Industrialized Asia	10	8	2	8	15	43 (18)
4	Sub-Saharan Africa	10	9	25	17	5	66 (51)
5	N Africa, W & C Asia	17	10	20	15	12	74 (45)
6	S & SE Asia	15	9	25	10	7	66 (44)
7	Latin America	20	10	20	12	10	72 (42)

Source: Global Food Losses and Food Waste, 2011, FAO

The total losses are assessed at less than 20% for most crops in Table 3.4.17 which is far below the commonly perceived losses at about 40%. In Table 3.4.18, the losses in processing and packing stage is

estimated at 25% in the South and South-eastern Asia Region. Considering only about 2% of the total production of vegetables and fruits is processed in India, 44% of the total losses in the Table 3.4.18 might be an overestimation in case of India. It can be possible calculation that the losses in the supply chain in India is only about 20% (44% - 25%) from the Table 3.4.17. Nevertheless, the estimation should be assessed by the further study as same as the price changes.

Table 3.4.17 shows a similar percentage of the losses for all vegetables and apple, while the losses must be different from crop to crop. For example, common leaf vegetables are more perishable and easier to get losses than common fruits vegetables. The estimated losses in the Table 3.4.17 should be assessed for this reason, too.

It is noted that a direct measurement of the losses from harvesting to consumption is physically impossible even though an assessment study will be carried out. The losses are generally assessed by various kinds of existing information about the volume and quality of target commodities in the stage of harvesting, marketing, processing and consumption in combine with several sample surveys. However, the assessment cannot be successfully accomplished in many developing countries including India due to a shortage of the necessary information. The difficulty may cause that most literatures on food losses have only mentioned an outline of the losses without specific data indicating quantitative losses in each stage of supply chain by crops. A large-scaled and comprehensive survey should be made at the field level if the losses of specific crops (e.g. cabbage, tomato, etc.) in a specific area (e.g. Himachal Pradesh) shall be assessed with a certain level of reliability.

(2) Increase in Farmers' Income

Increased farmers' income can be achieved by increasing value of harvested crops and maintaining the value (reducing losses) in the process of post-harvest handlings and marketing. In addition, a streamlined marketing system contributes to reduce the marketing costs, as well as to maintain the value of crops.

Table 3.4.19 Policies to Increase and Maintain Value of Vegetables and Fruits

No	Strategy	Measures
1	Value addition	Sorting/grading, Packaging and Processing
2	Value maintenance (loss reduction)	Packaging, Environment management in marketing and Efficient marketing
3	Efficient marketing	Sorting/grading, Packaging, Improved means of transportation & handling and Reduced intermediate agencies

Source: JICA Survey Team

Whilst there are various patterns of projects combining above mentioned strategies and measures at the field level, a "contract farming between farmers and trading and processing companies" and an "expansion of farmers' operation in marketing and processing business (including a joint venture with a company)" could be typical examples of the projects. Both examples combine the above mentioned three strategies in their business model. Though an attempt to assess value change of vegetables and fruits in the supply chain in Himachal Pradesh did not have an expected outcome, it is widely understood that the marketing system in India has a big challenge to overcome its inefficiency with higher costs and losses due to a highly segmented market structure. As shown by an example in Japan in Table 3.4.16, an aggressive business operation in the marketing by farmers groups or cooperatives should increase the potential for streamlining the supply chain and for increasing farmers' share in added value in the supply chain.

However, careful attention should be paid to the fact that an increased value of farm produce and reduced marketing costs are necessary but not sufficient condition for increasing farmers' share in the added value. For example, farmers groups may have a deficit in marketing business with accumulated running costs if the business is poorly managed by the groups. For another example, there are a lot of cases that farmers are burdened with additional works without due payment under a contract farming if farmers themselves do not have an enough bargaining power. It is quite common that each stakeholder has a conflicting interest in a value chain in agricultural sector. Distribution of added value among the stakeholders shall basically be determined by a power balance of the stakeholders. It is, therefore, necessary for farmers to empower themselves so that they will be able to fill the roles mentioned below.

Then, unified cooperation of farmers with solidarity and an intensive administrative intervention on sustainable basis are indispensable for the empowerment.

- To maintain a stable supply of agricultural produce in terms of quantity and quality
- To increase added value of agricultural produce (sorting/grading, packaging and processing)
- To collect and process market information for making a business strategy/plan
- To operate a business (business planning, organization management, finance and accounting)

3.4.10 Impacts of COVID-19 and GOI's Agricultural Market Reform Policy

(1) Impacts of COVID-19 on Agricultural Supply Chain

India is the 2nd largest country in the world in terms of accumulated number of infections with COVID-19 as of the end of September 2020, and the number continues to increase. India has been faced with worrisome socio-economic situation that seriously suffered from COVID-19's impact. Agricultural supply chains in India are no exemption in terms of the impact. A ban on inter-state movement with a lockdown imposed by GOI has a substantial influence not only on commodity distribution, but also on liquidity of human resources and money. As a result, India is faced with the worrisome situation of supply and demand for agricultural produce in the medium- to long-term forecast. HPAMB evaluates the COVID-19 impacts and the common concerns about agricultural supply chains in Himachal Pradesh in the future are described below.

- Functional decline of the supply chain due to decreased liquidity in terms of manpower, commodity, information, capital, etc.
- Shrinkage of market demand for high value produce, e.g., exotic vegetables, flowers, etc., due to the worsening business condition of high-class hotels and restaurants as the tourism industry is an important economic sector in Himachal Pradesh
- Setback of crop diversification as more farmers plan to grow traditional crops for risk mitigation due to shortage of cash money and inputs
- Decrease in export and import, and use of imported inputs due to unstable foreign exchange rate

However, the amount of agricultural produce in the market did not fall much for a long time. The state and central governments have taken rapid measures to activate agricultural supply chains as the produce are base commodities supporting people's daily lives. HPAMB reported that the supply of agricultural produce has been commenced with the issuance of curfew passes to transporters by the state authority after about one week of the lockdown, and not even a single *mandi* was closed due to any COVID-19 related incident to date. Many APMCs in Himachal Pradesh also reported that the overall supply of agricultural produce remained stable whilst some APMCs estimated that the supply volume decreased by 10-15% compared last year. The end distribution networks to consumers in urban areas were smoothly maintained by door-to-door service providers. It is generally understood that the supply chain in Himachal Pradesh was gradually brought back to the normal course of business although the future status still depends on the degree of COVID-19 damage in the future.

(2) GOI's Agricultural Market Reform Policy

The negative impacts of COVID-19 on the supply chain shall become gradually apparent and become the new normal in the post COVID-19 era if the damage remains to spread over wide areas for a long time. It is considered that COVID-19 has exposed various aspects of common and longstanding issues of the supply chains in India. It seems that GOI intends to solve the issues through new policies by seizing the opportunity to address the COVID-19 impacts. As discussed in the previous sub-chapter "Status of APMC and *Mandi*", many literatures suggest that the APMC model has failed in performing the expected role as the outdated legal framework cannot adopt to the changing social needs, and it has made a negative impact on the ability of farmers.

GOI has recognised the problem of outmoded agricultural supply chain system for a long time. Then, GOI announced the Model Act called "Agricultural Produce Marketing (Regulation and Promotion) Act, 2003" (Model APMC Act 2003) to address the problem. The outline of the Model APMC Act 2003 is

summarised below; contract farming, direct marketing and setting up of private markets are pillars of the reform policy.

- Setting up markets in the private/cooperative sector
- Rationalisation of market fees (a unified single fee)
- Promotion of contract farming
- Direct marketing
- Grading and standardisation

As agriculture is a state subject in India, state governments have a broad discretion to implement measures and policies in agricultural development at the field level in accordance with the governments' interests, and GOI can only advise guidelines like Model Act to state governments. Agricultural marketing in states is governed by their respective Agricultural Produce Market Committee (APMC) Acts under such administration structure in India. The GOI's reform policy stipulated in the Model APMC Act 2003, therefore, has not fully penetrated into the APMC Acts enacted by the state governments. In recent years, GOI has strengthened its intervention in agricultural market reforms, as the administration places considerable emphasis on the reforms to achieve its commitment to realise an income doubling of farming communities.

Whilst eNAM launched in 2016 is a part of the GOI's intervention, GOI additionally announced the "State/UT Agricultural Produce and Livestock Marketing (Promotion and Facilitation) Act, 2017" as a replacement for the Model APMC Act 2003. The remarkable points of the new act are summarised below whilst it continues the basic policy of the Model APMC Act 2003.

- Deregulation of market transaction
Liberalising a license for the market establishment to private players (traders, warehouses, and processors) including farmers to provide alternative and wider options for the marketing in addition to mandi. Different licenses shall be unified into a common platform within the state and at the national level.
- Unification of market fees
Unifying different market fees which are customary charged in the mandis for vague reasons as stated below.
Market fee: not more than 1% for fruits and vegetables and 2% for food grain
Commission agents' fee: up to 2% for non-perishables and 4% for perishables

GOI also announced the "State/UT Agricultural Produce and Livestock Contract Farming and Services (Promotion and Facilitation) Act, 2018" in May 2018 which separates the articles regarding contract farming from the Model APMC Act 2003. Although the Model APMC Act 2003 has articles to promote contract farming, there are a limited number of examples of success with reasons, i.e., asymmetry between farmers and enterprises in various aspects, farmers' weak respect for norms (breach of contract) and small scale of farming. The basic strategy of the new act is awareness of countermeasures to address the issues as shown below.

- Establishment of a promotion agency for contract farming at the state level
- Supporting and activating FPOs (cooperatives and FPCs: Farmer Produce Companies)

GOI announced a new market reform policy in May 2020 as a successive part of GOI's long-term attempts to streamline the agricultural supply chain. GOI intends to provide a legal framework to facilitate the following outputs of market reforms with the policy:

- "adequate choices" to farmers to sell their produce at attractive prices
- barrier-free inter-state trade, and
- E-trading of agricultural produce

More specifically, GOI amended the following three ordinances:

- The Essential Commodities (Amendment) Ordinance, 2020
Trade of essential food stuff, i.e., cereals, edible oils, oilseeds, pulses, potatoes, and onions will be deregulated. Private traders including processors will enter in the bulk trading of the food stuff. Consequently, competitiveness in the trade will increase.
- The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Service Ordinance, 2020

Contract farming will be promoted in a fair and transparent manner. Farmers and private agribusiness will benefit from risk mitigation, assured returns, and standardisation of quality.

- The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Ordinance, 2020
Transparent and barrier-free inter-state and intra-state trade will be accelerated through E-trading system. Farmers and private traders will enjoy a reasonable price of agricultural produce through free and competitive marketing channels.

3.4.11 Agribusiness Related to Supply Chains of Vegetables and Fruits

(1) Long-term Storage Facilities (CA Storages and Cold Storages)

CA storages and cold storages are essential storage facilities in the supply chains of vegetables and fruits. The following Table 3.4.20 show the list of long-term storage facilities in Himachal Pradesh managed by the private sector and the government sector (HPMC: Horticulture Produce Marketing Corporation), respectively.

Table 3.4.20 CA Storages and Cold Storages in Himachal Pradesh (Private Sector)

Non-disclosure information

Non-disclosure information

Source: AGRISNET, State Government of Himachal Pradesh & Interview Survey
(<http://www.hpagrisnet.gov.in/Agrisnet/Horticulture/pdf/List%20of%20CA%20stores%20in%20Himachal%20Pradesh.pdf>)

Table 3.4.21 CA Storages and Cold Storages in Himachal Pradesh (HPMC)

Non-disclosure information

Source: HPMC

Whilst Himachal Pradesh is famous for apple production and, the most storages are mainly used in apple supply chains. The stored apples are marketed to various states in the whole country albeit mainly in the northern Indian region. The storages are usually equipped with grading and packing facilities. The total capacity of CA storages in the above Table 3.4.21 is about 76,000 tons, whilst the capacity of cold storages is 11,000 tons. In addition, development of about 10,500 tons of CA storage facilities in total is planned for HPMC under the on-going Himachal Pradesh Horticulture Development Project (HPHDP) financed by the World Bank. According to the project implementation paper on March 18, 2016, the total production of apple in Himachal Pradesh is about 625,000 tons in the 2014/15 season. Given that about one-third of the production is marketed through extensive distribution networks, the total capacity of the established long-term storages can cover about 30% of the total marketed amount of apple soon. HPHDP has an ambitious apple production plan targeting to increase the production to 1,467,800 tons by 2030. The necessary capacity for long-term storage facilities for apple will increase much if HPHDP accomplishes the target.

A part of the storages in private sector are not functional for some reasons. Whilst six storages out of the total 15 functional storages are utilized by the owner companies for own trading business, all companies directly procure apple to be stored from producers. Remained 9 storages are rented out to farmers (groups), CAs and other private traders. The owner companies are likely to run a rental business for the storage space. In case of HPMC storages, all storages except for 1 non-functional storage are rented out to farmers (groups), CAs and other private traders.

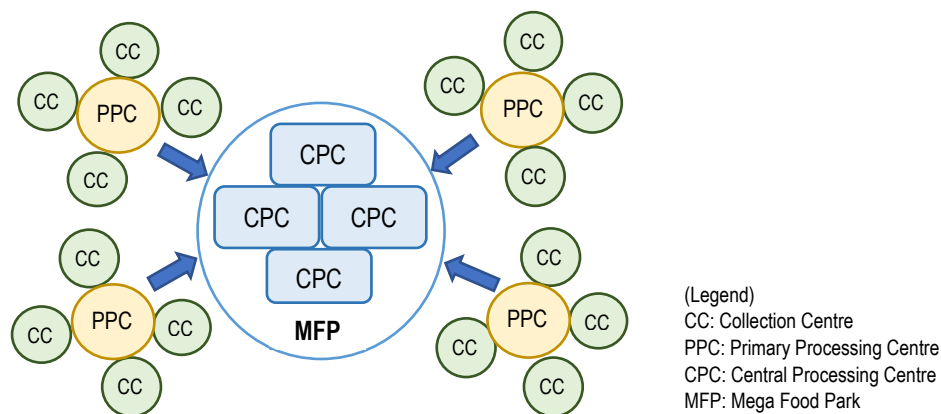
HPMC is concentrating on a storage rental business instead of utilizing the storages for its own trading business. HPMC is renting out the storages through tendering process. As HPMC does not determine qualifications for the tender, any individual, society, group of farmers and company can participate in the tender. The minimum storage space for renting is 36 – 40 m² (equivalent to 80 tons storage in terms of apple), and the initial contract term is 5 years which can be extended on a yearly basis. According to

HPMC, commercialized large-scaled farmers are common members of farmers groups which are renting the storage at present. They usually hold a joint sale stored apple to commercial traders.

The above Table 3.4.21 show that farmers groups and CAs are common customers of the long-term storage facilities. The fact implies that there are ambitious farmers groups and CAs who have advanced to apple trading business in Himachal Pradesh, though the number is still limited. It may be possible that FPOs to be established by the Project will be a customer of the storage facilities managed by the private companies and HPMC. Farmers groups who have already entered apple trading business could be a visible model case for the FPOs, whilst the FPOs may handle various kinds of vegetables and fruits.

(2) Food Processing Industries

In general terms, the people of India traditionally have a strong diet orientation for fresh vegetables and fruits, although processed foods are becoming popular among the people in recent years. The development of food processing industries in India is, therefore, left behind compared with neighbouring countries in Asia. GOI started the Mega Food Park Scheme in its 11th 5-Year Plan (2007-11) through the Ministry of Food Processing Industries (MOFPI) to develop industry clusters as shown in the following figure. The scheme aims at facilitating the development of food processing industries and creating job opportunities in rural areas. As local small- to medium-scale enterprises play a major role in the food processing industries, GOI has the key principle that the respective state governments take the initiative in implementing the scheme whilst GOI provides necessary support to the state governments.



Source: JICA Survey Team

Figure 3.4.3 Image of Mega Food Park

In Himachal Pradesh, the Himachal Food Park has been developed on 55 acres (about 22 ha) of land in Una District under the Mega Food Park Scheme in 2012. There are six agribusiness companies running their business in the park at present as shown in the Table 3.4.22. In addition, there are three Primary Processing Centres (PPCs) in Kangra, Mandi and Solan districts.

Table 3.4.22 Companies in Himachal Food Park

Non-disclosure information

Source: JICA Survey Team based on collected information

According to the brochure of Cremica Foodpark Ltd, the developer of the Himachal Food Park, the total processing capacity of vegetables and fruits in the park is 750 tons/day. The company made a production

plan of the facilities in the park in 2020/21 as shown in the Table 3.4.23. Major agricultural produce processed in the park are apple and tomato whilst some other vegetables and fruits are also processed.

Table 3.4.23 Production Plan of Himachal Food Park in 2020/21

No	Crop	Processing (ton)
1	Apple	45,000
2	Tomato	40,000
3	Pear	5,000
4	Guava	5,000
5	Carrot	5,000
6	Beetroot	5,000
7	Strawberry	5,000
8	Chili	1,000

Source: Cremica Foodpark Ltd

The Table 3.4.24 shows the number of food processing companies in Himachal Pradesh by districts. There are 272 food processing companies in Himachal Pradesh in total. Out of the total, there are only 43 companies⁶ which are likely to process vegetables and fruits as the food processing companies consist of many flour mills, wheat products (biscuit, pasta, etc.) factories, spice factories and various kinds of snack food factories. The food processing companies are almost occupied with small and tiny companies, and the average number of employees is only 17.7 employee/company. Whilst the number of vegetable and fruit processing companies is high in Kangra, Kullu and Solan districts compared with the other districts, a relatively larger scale companies are established in Sirmaur and Una districts.

Table 3.4.24 Number of Food Processing Companies in Himachal Pradesh

No	District	All Food			Vegetables and Fruits Only		
		Number of Industries	Total Employee	Average Employee	Number of Industries	Total Employee	Average Employee
1	Bilaspur	16	100	6.3	4	23	5.8
2	Chamba	7	39	5.6	2	13	6.5
3	Hamirpur	41	187	4.6	4	22	5.5
4	Kangra	41	363	8.9	6	66	11.0
5	Kinnaur	2	12	6.0	1	5	5.0
6	Kullu	34	593	17.4	7	54	7.7
7	Lahaul & Spiti	0	0	-	0	0	-
8	Mandi	62	497	8.0	0	0	-
9	Shimla	7	51	7.3	2	17	8.5
10	Sirmaur	9	393	43.7	5	236	47.2
11	Solan	32	477	14.9	8	62	7.8
12	Una	21	2,093	99.7	4	67	16.8
Himachal Pradesh		272	4,805	17.7	43	565	13.1

Source: Department of Industries, Himachal Pradesh

Ten companies (four in Sirmaur District and six in Solan District) out of the 272 companies in the Table 3.4.24 have started their business with support from the Single Window Clearance System (SWCS) of Himachal Pradesh. SWCS has been developed as a single window service framework guided by GOI to facilitate investor and increase investment in all business sectors. Investors can make the necessary approval process for 35 services from ten state government departments through SWCS.

The food processing companies are main candidates for making a business partnership with FPOs to be established by the Project. Promotion of matching opportunities between the FPOs and the companies should enable to encourage local food industries in parallel with incubating the FPOs.

3.4.12 Government Schemes Supporting Supply Chains of Vegetables and Fruits

GOI places emphasis on promoting food processing and value-chain development to facilitate the industrial development and the job creation in rural areas. Whilst GOI has implemented the Mega Food Park Scheme as mentioned above and a lot of other supporting schemes, it has launched a new central sector scheme named Pradhan Mantri Kisan Sampada Yojana (PMKSY) as an umbrella scheme

⁶ According to the information of Food Processing Resources Maps in MOFPI portal site (<https://foodprocessingindia.gov.in/>), there are 116 companies processing vegetables and fruits registered by the Central & State Governments in Himachal Pradesh.

incorporating ongoing schemes. According to the website of MOFPI which is the implementation agency of PMKSY, GOI allocated INR 60 billion for the period 2016-20 in expecting the following PMKSY's effect by the year 2019/20. As PMKSY is a comprehensive package of various schemes, specific projects are implemented by each scheme under PMKSY.

- Leverage investment: INR 314 billion
- Handling agro-produce: 33.4 million ton (INR 1,041.25 billion)
- Beneficiaries: 200,000 farmers
- Job creation: 530,000 (direct/indirect)

MOFPI is focusing on building cold chain infrastructure across the country to arrest post-harvest losses of horticulture and non-horticulture produce by seamless transfer of perishables from production to consumption areas through PMKSY and encouraging the creation of cold storages/ primary processing/ and transportation facilities. According to a website⁷, MOFPI has sanctioned 39 Mega Food Parks and 298 Integrated Cold Chain Projects throughout the country for implementing PMKSY including a Mega Food Park and 6 Integrated Cold Chain Projects from Himachal Pradesh this year.

The following ongoing schemes in Himachal Pradesh should make a strong linkage with the Project. The Project is expected having a close association with the schemes as they are aiming at supporting farmers groups and food industries in the state by providing not only a financial assistance but also various capacity building programs.

(1) PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme)

MOFPI has launched PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme) in June 2020. The scheme adopts One District One Product (ODOP) approach for the implementation, and provides financial, technical and business support for the upgrading of existing micro food processing enterprises, including FPOs and women's self-help groups (SHGs). The implementation period of the scheme is five years (2020/21-2024/25) and 200,000 micro enterprises are expected to benefit from the scheme.

(2) State Mission on Food Processing (SMFP) in Himachal Pradesh

MFPI had launched a centrally sponsored scheme of National Mission on Food Processing (NMFP) in 2012/13. As NMFP was de-linked from the GOI's scheme in 2015/16, the Himachal Pradesh State Government has decided to continue a new scheme named "State Mission on Food Processing (SMFP)" as its own scheme.

SMFP was developed to increase the production of food crops and to promote the sustainable agricultural sector in Himachal Pradesh. The "Guidelines for Implementation of State Mission on Food Processing (SMFP)" published by the Department of Industries, Himachal Pradesh has stated the objectives of SMFP as follows:

- To promote facilities for post-harvest operations including setting up of food processing industries;
- To undertake decentralisation of the schemes so far operated by the Ministry of Food Processing Industries (MOFPI) in order to take into account the requirements suitable to the local needs;
- To augment the capacity of food processors working to upscale their operations through capital infusion, technology transfer, skill upgrading and handholding support;
- To support established self-help groups working in the food processing sector to facilitate them to achieve SME status;
- Capacity development and skill upgrading through institutional training to ensure sustainable employment opportunities to the people and also to reduce the gap in the requirement and availability of skilled manpower in the food processing sector;
- To raise the standards of food safety and hygiene in order to meet the norms set up by FSSAI;
- To facilitate the food processing industries to adopt HACCP and ISO certification norms;
- To augment farm gate infrastructure, supply chain logistics, storage and processing capacity; and

⁷ <https://smstreet.in/msmenews/mofpi-sanctioned-39-mega-food-parks-298-integrated-cold-chain-projects/>

- To provide better support system to the organised food processing sector.

Whilst the State Level Empowered Committee (SLEC) chaired by the Principal Secretary, Industries has been established to carry out the administration of SMFP, the Directorate of Industries, Himachal Pradesh acts as the nodal agency for implementing the scheme. SMFP has six schemes as shown in the Table 3.4.25 below. Scheme No. 2 in the Table 3.4.25 is subject to the proviso of “for Non-Horticultural Products”. According to the collected information from the Directorate of Industries, this proviso is added to avoid the duplication of the scheme of Mission for Integrated Development of Horticulture (MIDH) as discussed below.

Table 3.4.25 SMFP Schemes

No.	Scheme	Grant-in-aid	Maximum Limit of Grant-in-aid
1	Technology Upgrading/Establishment/Modernisation of FPIs (Cost of Plant and Machinery & Technical Civil Works)	33.33%	Max. INR 7.50 million
2	Cold Chain for Non-Horticulture Products	50%	Max. INR 50 million. Interest subvention @ 7% per year subject to max. of INR 2.5 million per year for 7 years.
3	Promotional Activities a. Organising Seminar/ Workshops b. Conducting Studies/ Surveys c. Support to Exhibitions/ Fairs d. Advertisement and Publicity	50%	Max. INR 0.4 million Quantum of assistance will depend on the merits of the proposal.
4	Scheme for Creating Primary Processing Centres/ Collection Centres in Rural Areas	75%	Max. INR 25 million
5	Modernisation of Meat Shops	75%	Max. INR 0.5 million
6	Reefer Vehicles	50%	Max. INR 0.5 million

Source : Annual Administration Report 2015-16, Department of Industries, HP

(3) Mission for Integrated Development of Horticulture (MIDH)

The Department of Agriculture and Cooperation, Ministry of Agriculture of GOI has integrated several similar GOI schemes with a view to promote holistic development of the horticulture sector and launched the Mission for Integrated Development of Horticulture (MIDH) in 2014/15 (see the following Table 3.4.26).

Table 3.4.26 GOI Schemes Integrated into MIDH

No	Schemes Integrated	Target Group/Area of Operation
1	National Horticulture Mission (NHM)	All states and union territories (UTs) except states in the Northeast and Himalayan Region
2	Horticulture Mission for North East and Himalayan States (HMNEH)	All states in the Northeast and Himalayan Region
3	National Bamboo Mission (NBM)	All states and UTs
4	National Horticulture Board (NHB)	All states and UTs focusing on commercial horticulture
5	Coconut Development Board (CDB)	All states and UTs where coconut is grown
6	Central Institute for Horticulture (CIH)	Northeast states, focusing on human resource development and capacity building

Source: Vikaspedia (<https://vikaspedia.in/InDG>)

MIDH aims at enhancing the level of the whole value chain in the horticulture sector covering fruits, vegetables, root and tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa and bamboo. The “Operational Guidelines for Mission for Integrated Development of Horticulture” published by the Horticulture Division, Department of Agriculture and Cooperative, Ministry of Agriculture of GOI has stated the objectives of MIDH as follows:

- Promote holistic growth of the horticulture sector, including bamboo and coconut through area-based regionally-differentiated strategies, which include research, technology promotion, extension, post-harvest management, processing and marketing, in consonance with the comparative advantage of each state/region and its diverse agro-climatic features;
- Encourage aggregation of farmers into farmer groups like FIGs/FPOs and FPCs to bring economies of scale and scope;
- Enhance horticulture production, augment farmers’ income and strengthen nutritional security;

- Improve productivity by way of quality germplasm, planting material and water use efficiency through micro irrigation; and
- Support skills development and create employment generation opportunities for rural youth in horticulture and post-harvest management, especially in the cold chain sector.

Whilst MIDH is a GOI-sponsored scheme, the degree of GOI's contribution varies from sub-scheme to sub-scheme as shown in the following Table 3.4.27. It is, however, noted that the Table 3.4.27 only shows a simple overview of the contribution. The above-mentioned operational guidelines for MIDH precisely stipulates the conditions and contents of the financial contribution for segmented projects in the sub-schemes.

Table 3.4.27 GOI's Contribution to MIDH

No	Sub-schemes	GOI Contribution
1	National Horticulture Mission (NHM)	60%
2	Horticulture Mission for North East and Himalayan States (HMNEH)	90%
3	National Bamboo Mission (NBM)	NA
4	National Horticulture Board (NHB)	100%
5	Coconut Development Board (CDB)	100%
6	Central Institute for Horticulture (CIH)	100%

Source: MIDH (<https://midh.gov.in/midhSchemes.html#>)

As discussed above, MIDH has been launched with a view to promote the holistic development of the horticulture sector. On the other side of the coin, MIDH has many aspects of patchwork gathering different schemes. It seems that MIDH still lacks an integrated structure as a scheme. Regarding supply chains in the horticulture sector, the Horticulture Mission for North East and Himalayan States (HMNEH) and the National Horticulture Board (NHB) in the above table must be sub-schemes having a direct relationship with the development. Both sub-schemes mainly support development projects of long-term storage facilities, e.g., CA storages and cold storages, including ancillary facilities for grading, packing, etc. NHB supports a project with more than INR 50 million investment, whilst HMNEH supports a project with less investment, according to the collected information. It is confirmed that six CA storages listed in Table 3.4.20 (Nos. 1, 2, 8, 11, 13 and 14) were supported by HMNEH.

3.5 Minor Irrigation and Village Infrastructure

3.5.1 General

(1) Irrigation

As per the 2014-15 statistics of the Department of Agriculture, Himachal Pradesh, the state has a total arable area of 1,063,213 ha (19% of the state's geographical area) out of which 854,230 hectares (80% of the total arable area of the state) is used to cultivate various agricultural crops like cereals, coarse cereals, pulses, oilseeds, spices and fibre crops whilst the remaining 208,982 ha is used to grow various horticulture plantations like apple, cherry, pear, peach, plum, etc.

All groundwater schemes and surface water schemes (both flow and lift) having culturable command area (CCA) up to 2,000 hectares individually are classified as "Minor Irrigation" schemes and the total area is 232,460 hectares (as of March 2016.). The CCA of the DoA and DoH schemes are included in the total area of "Other Dept.", which is 100,657 hectares.

Table 3.5.1 Total CCA Developed by I&PH and Other Dept. in Himachal Pradesh State

No.	Sector	CCA covered up to 31.03.2016 (ha)	CCA (ha)	Total Area (ha)	Remarks
		I&PH	Other Dept.		
1	Major Irrigation	15,286	0	15,286	more than 10,000 ha
2	Medium Irrigation	19,151	0	19,151	more than 2,000 ha
3	Minor Irrigation	131,803	100,657	232,460	less than 2,000 ha
	Total	166,240	100,657	266,897	

Source: Official Website of HPIPH

(2) Road

Himachal Pradesh Public Works Department (HP PWD) is engaged in the planning, construction and maintenance of roads, bridges, ropeways, and buildings (both residential and non-residential) of various government departments in the state. Road classification is a fundamental part of planning and managing the road network. It is important to note, however, that classification by itself does not in any way predetermine the level-of-service or outcome experienced for any particular user. Classification is simply the basis or starting point for guiding decisions about the management and future planning of the network, to ensure that this is carried out in a consistent and transparent way. According to national norms (IRC recommendations), the roads are classified as: 1) National Highways, 2) State Highways, and 3) District Roads. Village roads are classified as District Roads.

Table 3.5.2 Total Length of Road in Himachal Pradesh State

Class	Total Length (km)			Remarks	
1) National Highways	1,238 km			Managed by National Highway Authority of India (NHAI)	
2) State Highways	1,625 km			Managed by HP PWD	
3) District Roads	Major (Inter District Road) 1,753 km	Minor (Other Road) 34,870 km	Total 36,623 km	Managed by HP PWD	
	Sr. No.	District	Metalled Roads (km)	Un-metalled roads (km)	Total Roads (km)
	1	Bilaspur	1,543	220	1,763
	2	Chamba	1,671	890	2,561
	3	Hamirpur	1,850	139	1,989
	4	Kangra	5,810	461	6,271
	5	Kinnaur	518	366	884
	6	Kullu	1,323	714	2,037
	7	Lahaul & Spiti	674	612	930
	8	Mandi	3,658	2,021	5,679
	9	Shimla	3,655	2,125	5,780
	10	Sirmour	1,775	1,413	3,188
	11	Solan	2,297	756	3,053
	12	Una	1,977	155	2,132
Total			26,751	9,872	36,623

Source: Official Website of HPPWD

(3) Water Supply

The Himachal Pradesh Irrigation and Public Health Department is responsible for the provision and operation and maintenance of drinking water. There are 9,516 drinking water supply schemes completed in the state. Out of these, 2,391 are lift, 404 are tube wells, and 6,721 are gravity schemes. The zone-wise details of the water supply schemes are as follows:

Table 3.5.3 District-wise Details of Water Supply Schemes

Zone	Circle	Number of Schemes			
		Gravity	Lift	Tube well	Total
Shimla	Shimla	754	171	0	925
	Rohru (in Shimla)	1,286	73	0	1,359
	Nahan (in Sirmor)	451	714	79	1,210
	Solan	417	337	0	788
	R/Peo (in Kinnaur)	532	10	0	54
Hamirpur	Bilaspur	74	197	5	276
	Una	10	42	52	204
	Hamirpur	136	271	0	407
Mandi	Kullu (including Lahaul & Spiti)	868	21	1	890
	Sundernagar (in Mandi)	1,230	240	4	1,474
Dharamshala	Nurpur (in Kangra)	6	62	126	194
	Dharamshala (in Kangra)	125	250	37	412
	Chamba	832	3	0	835
Total		6,721	2,391	404	9,516

Source: Official Website of HPIPH

(4) Electricity

Himachal Pradesh State Electricity Board Limited (HPSEBL) is an electricity board which is responsible for the supply of uninterrupted and quality power to all consumers in Himachal Pradesh. Power is being supplied through networks, transmission, sub-transmission, and distribution lines laid in the state.

Himachal Pradesh is extremely rich in hydroelectricity resources. The state has about 25% of the national potential. About 27,436 MW of hydroelectric power can be generated in the state by the construction of various hydroelectric projects on the five perennial river basins. Out of the total hydroelectric potential of the state, 10,519 MW is harnessed so far, out of which only 7.6% is under the control of the Himachal Pradesh State Government whilst the rest is exploited by the central government on some industries. It is also the biggest source of income to the state as it provides electricity to other states. Himachal has enough resources to generate surplus power but in the winter, less flow of water in rivers and increases in lighting and heating load can result in power shortages that overshoot ten lakh units per day. Due to increased industrialisation and rural electrification, this figure is expected to rise even further.

3.5.2 Minor Irrigation

(1) Type of Irrigation

There are three major types of irrigation system, i.e., flow irrigation, lift irrigation, and tube well irrigation system.

Flow irrigation system and lift irrigation system use surface water. The surface flow schemes typically consist of tanks, check dams, and structures and can serve as water conservation cum groundwater recharge scheme. These structures are generally prevalent in hilly regions. Lift irrigation schemes are generally built in regions where the topography does not permit direct flow irrigation from rivers and streams and hence, water have to be lifted into irrigation channels by installing pump machine.

The groundwater schemes comprise dug well, dug-cum-bore wells, shallow and medium tube wells and deep tube wells. Dug wells cover ordinary open wells of varying dimensions, dug or sunk from the ground surface into a water bearing stratum to extract water for irrigation. These are broadly masonry wells, kutchha wells (earth wall wells) and dug-cum-bore wells. Most of such schemes are of private nature belonging to individual cultivator. A shallow tube well consists of a bore hole built into the ground with the purpose of tapping groundwater from porous zones. In sedimentary formations, the depth of a shallow tube well does not exceed 25 metres. These tube wells are either cavity tube wells or strainer tube wells. The 5th Minor Irrigation Census introduced the concept of medium tube wells with depth in the range of 35-70 metres. Deep tube wells extend to a depth of 70 meters and more and are designed to give a discharge of 100-200 cubic metres per hour.

1) Flow Irrigation System

The flow irrigation system carries water by gravity from water sources to the field through canal system with the construction of intake facilities and weir (called check dam) in most cases. The primary canals are proposed to be lined or pipeline according to the site conditions.

In hilly areas, there are small rivers called *nallah* flowing with sufficient gravity heads which are being tapped for irrigation. Snow-fed water sources are available in Kinnaur, Kullu, Lahaul Spiti and other snow-rich areas.

2) Lift Irrigation System

Lift irrigation system is developed (with construction of check dam in some cases) to carry water by means of pumps from the water source to the delivery chamber, which distributes the water to the fields by suitable distribution system such as lined canal in most cases or through pipeline.

3) Tube Well Irrigation System

The valleys in Kangra, Mandi, Sirmour, Solan, and Una districts have potential aquifer, where groundwater can be exploited for small-scale irrigation and micro irrigation. The discharge of the wells generally varies from 10 to 40 Lps which can be utilised through the construction of tube well schemes.

(2) Adequacy of Irrigation

About 25% of the total cultivated area (including both agriculture and horticulture crops) in the state is irrigated and about 27% of the gross cropped area under agriculture crops is irrigated. The ratio of irrigated area in Lahaul & Spiti and Kinnaur districts are relatively high compared with the remaining ten districts.

In Lahaul & Spiti, 100% of the arable area is under irrigated cultivation, and in Kinnaur District, 64% of the cropped area is irrigated. The details of the district-wise area under irrigation and rainfed cultivation can be observed in the following table:

Table 3.5.4 District-wise Area under Irrigated and Rainfed Conditions in Himachal Pradesh (unit: ha)

Districts	Agriculture Crops				Horticulture Crops				% of IRR on Agri. and Horti.
	IRR	RF	Total	%IRR	IRR	RF	Total	% IRR	
Bilaspur	5,971	52,131	58,103	10%	1,247	4,988	6,235	20%	11%
Chamba	10,829	55,204	66,033	16%	202	16,865	17,067	1%	13%
Hamirpur	1,602	65,582	67,184	2%	5,225	1,981	7,207	73%	9%
Kangra	98,698	108,442	207,140	48%	11,533	26,906	38,439	30%	45%
Kinnaur	5,373	3,645	9,018	60%	8,378	4,029	12,408	68%	64%
Kullu	13,568	35,404	48,972	28%	6,005	24,019	30,023	20%	25%
Lahaul & Spiti	5,840	0	5,840	100%	300	0	300	100%	100%
Mandi	16,870	137,035	153,905	11%	313	33,940	34,253	1%	9%
Shimla	2,687	37,226	39,913	7%	0	45,586	45,586	0%	3%
Sirmaur	24,630	48,705	73,335	34%	4,150	10,690	14,841	28%	33%
Solan	19,465	36,800	56,265	35%	286	846	1,132	25%	34%
Una	24,288	44,235	68,523	35%	1,385	106	1,491	93%	37%
HP	229,821	624,410	854,231	27%	39,025	169,958	208,982	19%	25%

Source: State Irrigation Plan, Himachal Pradesh 2015-2020, IRR: Irrigated area in Hectares

(3) Micro Irrigation System

1) Drip Irrigation

Drip irrigation is the most efficient water and nutrient delivery system for growing crops. It delivers water and nutrients directly to the plant's root zone, in the right amounts, at the right time, so each plant gets exactly what it needs, when it needs it, to grow optimally. Farmers can produce higher yields whilst saving on water as well as fertilisers, energy and even crop protection products.

Water and nutrients are delivered across the field in pipes called 'dripperlines' featuring smaller units known as 'drippers'. Each dripper emits drops containing water and fertilisers, resulting in the uniform application of water and nutrients direct to each plant's root zone, across an entire field. Farmers prefer drip irrigation because of following reasons:

- Higher consistent quality yields.
- Huge water savings: no evaporation, no run off, no waste.
- 100% land utilisation – drip irrigates uniformly in any topography and soil type.
- Energy savings: drip irrigation works on low pressure.
- Efficient use of fertiliser and crop protection, with no leaching.
- Less dependency on weather, greater stability and lower risks.

2) Sprinkler Irrigation

Sprinkler irrigation system allows the application of water under high pressure with the help of a pump. It releases water similar to rainfall through a small diameter nozzle placed in the pipes. Water is distributed through a system of pipes, sprayed into air and irrigates in most of the soil type due to wide range of discharge capacity.

Advantages of sprinkler irrigation are as follows:

- Eliminates water conveyance channels, thereby reducing conveyance loss.
- Suitable in all types of soil except heavy clay.
- Water saving up to 30% - 50%.
- Suitable for irrigation where the plant population per unit area is very high.
- Helps to increase yield.
- Reduces soil compaction.
- Mobility of system helps in easy system operation.
- Suitable for undulating land.

(4) Existing Infrastructure Developed by HPCDP I

In HPCDP I, the following infrastructure have been constructed/ installed:

- Two hundred ten sub-projects, including lift irrigation system, flow irrigation system, and tube well irrigation system, have been constructed by HPCDP I.
- Twenty-three collection centres have been constructed by HPCDP I, out of which 3 are in Hamirpur, 3 in Bilaspur, 2 in Una, 7 in Mandi, and 8 in Kangra districts. One collection hut has also been constructed in Bilaspur District.
- Fifty-seven farm access roads and 58 solar systems have been constructed by HPCDP I. The district-wise details of both farm access road and solar system are shown in the table below.
- Micro irrigation system has been installed in 487.11 hectares, out of which sprinkler system has been installed in 448.23 hectares and drip system has been installed in 38.88 hectares.

Table 3.5.5 District-wise Details of Sub-projects under HPCDP I

Sr. No.	District	No. of Sub Projects			Area (in ha)		
		LIS	FIS	TW	Area under LIS	Area under FIS	Area under TW
1	Hamirpur	32			453.88		
2	Bilaspur	18	1		310.37	9.49	
3	Una	14		5	121.22		73.62
4	Mandi	12	50		168.50	1092.96	
5	Kangra	16	62		225.57	2215.49	
	Total	92	113	5	1279.54	3317.94	73.62
	Grand Total	210			4671.10		

Source: JICA Survey Team

Table 3.5.6 District-wise Details of Farm Access Roads under HPCDP I

Sr. No.	District	Farm Access Road (in nos.)	Length (in kms)	Solar System (in nos.)
1	Hamirpur	6	2.13	12
2	Bilaspur	2	1.06	11
3	Una	7	3.01	10
4	Mandi	23	17.15	12
5	Kangra	19	13.66	13
	Total	57	37.01	58

Source: JICA Preparatory Survey Team

Table 3.5.7 District-wise Details of Sprinkler System and Drip System under HPCDP I

Sr. No.	District	Sprinkler System (in ha)	Drip System (in ha)
1	Hamirpur	21.92	3.10
2	Bilaspur	25.30	2.56
3	Una	12.19	1.36
4	Mandi	312.79	12.36
5	Kangra	76.03	19.50
	Total	448.23	38.88

Source: JICA Survey Team

(5) Operation and Maintenance (O&M) in DoA and PMU

The DoA executes the work of the concerned scheme through Krishak Vikas Association using 90% of the estimated cost and the rest of the amount of 10% shall be kept for the O&M of the said scheme.

PMU executes the scheme and hands over the scheme to KVA. KVA themselves operate and maintain the scheme from their own funds collected from the members and water use charges.

(6) Issues of Present Condition in Minor Irrigation

- The farmers are not participating in the maintenance of the irrigation systems.
- Scattered and small holding of farmers land is inefficient in terms of O&M.
- No regular meetings of KVA regarding water management activities are held.

3.5.3 Development Procedure for Minor Irrigation

There are four classes of contractors in HPIPH Department, which are Class A, Class B, Class C, and Class D. The enlistment is revalidated every three years, from the date of expiry of the previous enlistment/revalidation. Based upon the performance of the contractor, the registration can be revalidated for a period of another three years. Only the contractors classified as Class A and Class B will be qualified for the tendering of the subproject construction work. They can work all over the Himachal Pradesh State.

Class A: The registration will be done by Chief Engineer and the contractor is eligible to work all over the Himachal Pradesh State. There is no limit of tendering for Class A contractor. The contractor should have the following staffs in its regular establishment:

- One Graduate Engineer in Civil Engineering with minimum experience of three years.
- One Diploma Holder in Civil Engineering with minimum experience of five years.
- One Surveyor with three years' experience.
- One Foreman (ITI trained).
- One Mason.

Class B: The registration will be done by Chief Engineer and the contractor is eligible to work all over Himachal Pradesh State. Class B contractor can take the work up to INR 1 crore. The contractor should have the following staffs in its regular establishment:

- One qualified three year-diploma in Civil Engineering with at least one-year experience.
- One Foreman (ITI trained).
- One Mason.

Class C: The registration will be done by Superintending Engineer and the contractor is eligible to work all over Himachal Pradesh State. Class C contractor can take the work up to INR 40 lakh. The contractor should have one mason in its regular establishment.

Class D: The registration will be done by Executive Engineer and the contractor is eligible to work within the zone of registration. Class D contractor can take the work up to INR 10 lakh.

3.6 Gender Related Matters

Women in India have been making major strides in all spheres of life, but they still have to cross barriers laid in their path to progress in a culture of male dominance. Women in the hill states of India face challenges peculiar to the region. Coupled with inequity, gender bias and gender discrimination inbuilt into the socio-economic system in the form of archaic customs and social taboos, they bear the burden of harsh weather and harsher terrain.

3.6.1 Basic Indicators

The following table shows the basic indicators for the gender status of Himachal Pradesh State.

Table 3.6.1 Basic Indicators Related to Gender Issues in Himachal Pradesh State

Indicators	India		Himachal Pradesh	
	Male	Female	Male	Female
Population (2011)	623, 724, 248	586,469, 174	3,481,873	3,382,729
Sex ratio	940		972	
Literacy	82.14	65.46	89.53	75.93
Health status (anaemic) NHFS 4		53%		53.5%
Life expectancy (sample registration survey 2013-17)	67.8 yrs	70.4 yrs	67 yrs	71.6 yrs

Source : Department of Statistic and Information, HP

About 90% of the population in Himachal Pradesh depends directly on agriculture, which provides direct employment to 62% of the total workers of the state. In the organised sector, women's employment is approximately 21.19%.

Himachal Pradesh also ranks as the second best performing state in the country on human development indicators after Kerala. One of the Indian government's key initiatives to tackle unemployment is the National Rural Employment Guarantee Act (NREGA). Participation of women in the NREGA has been observed to vary across different regions of the country. In 2009-2010, Himachal Pradesh joined the category of high female participation, recording a 46% share of National Rural Employment Guarantee Scheme (NREGS) work days for women. This was a drastic increase from the 13% that was recorded in 2006-2007.

3.6.2 Rural Situation and Women's Work Load in Himachal Pradesh

For rural women, their responsibilities of working in the farms and managing families are immense, with a large proportion of male members of the family engaging in seasonal migration for more lucrative work in the urban areas, and serving in the army. Most of them work twice as much as men, with half of that work spent on managing domestic chores and taking care of the children and the aged in the families.

And yet their contribution gets neither the recognition it deserves, nor is monetarily compensated.

This is true across the globe, despite the United Nations taking up several measures to address the situation. In India, although successive governments both at the centre and in the states have taken legislative and executive steps to improve the life of women, women's work continues to be undervalued and undercompensated, and the situation is no different in Himachal Pradesh.

In Himachal Pradesh, 85% of the agriculture workforce are women and 60% of the total workforce in agriculture and allied activities are female.

(1) Workforce Participation in Himachal Pradesh

Agriculture is the main occupation of the people of Himachal Pradesh and has an important place in the economy of the state. Himachal Pradesh is the only state in the country whose 89.96% of its population (Census 2011) lives in the rural areas. Therefore, dependency on agriculture/horticulture is prominent as it provides direct employment to about 62% of the total workers of the state.

For economic empowerment of women, their participation in the work is an important component towards measuring the gender equality or inequality. As per the 2001 census figures, among main workers, females constituted 32.8%, whereas among marginal workers, they accounted for 65.80%. It speaks of higher involvement of males in full-time work and that of females in seasonal work. Among non-workers, females account for 54.68%, which indicates the traditional culture of Himachal Pradesh society where women are mostly engaged in domestic work. Low literacy rate among females is the main reason for their non-participation in full-time work or jobs of professional nature. It also speaks of the lack of freedom in the choice of work.

Himachal Pradesh has 47.4% work participation of women in the labour force in rural areas, which is driven by agriculture, still the mainstay of the state's largely rural economy.

(2) Workload of Women in Rural Himachal Pradesh

Throughout the Himalayan region, the major role in agricultural production is played by women.

Table 3.6.2 Gender-based Percentage Share in Agricultural and Animal Husbandry Activities in Himachal Pradesh

Activity	Percentage Share (%)	
	Men	Women
Agriculture		
Ploughing	100	0
Land preparation and cold breaking	15	85
Sowing and transplanting	28	72
Gap filling	0	100
Inter culture	32	68
Wedding	6	94
Irrigation	50	50
Fertilizer application	55	45
Harvesting	29	71
Threshing and winnowing	42	58
Animal husbandry		
Tending cattle in shed	5	95
Grazing	52	48
Removing dung from shed	0	100
Fodder collection	7	93
Milking	4	96

Source: Mountain Women Development Centre Records (1995)

That statement encapsulates the situation in Himachal Pradesh. However, despite the various United Nations (UN) conferences on women, notably the UN Conference on Women in Beijing (1995) adopting an international instrument to adopt gender-disaggregated data, such data is difficult to find in the official statistics of Himachal Pradesh. Hence, this paper has attempted to reach out to independent research studies to throw some light on the workload of women in rural Himachal Pradesh.

The workload of women in Himachal Pradesh comprises:

- Primary production activities
- Secondary sector activities
- Trade, business and services, i.e., tertiary sector activities
- Household maintenance, management, shopping for own household
- Care of children, elderly, disabled of own household
- Community services
- Self-learning and education (of children)
- Personal care and self-maintenance
- Social, cultural and religious activities of the family

According to two studies carried out by researchers of Himachal Pradesh University, namely, 'Gender disparities in rural work in Himachal Pradesh', a doctoral thesis by Surjeet Singh (2014), and 'Labour time allocation and valuation of women contribution in household activities: a comparative study of rural and urban areas of Himachal Pradesh' by Lalita Devi (2013), the following points are identified:

- Women shoulder the entire burden of looking after livestock, bringing up children and other household chores. The extent of health hazards faced by farm women in farm activities include: (i) 50% in transplanting and 26.5% in harvesting under farm activities; (ii) 50% threshing, 33% drying and 67% parboiling under post-harvest activities; and (iii) 47% shed cleaning, 23% fodder collection and 27.5% milking under livestock management. Their hard work has not only been unpaid but also remained mostly unrecognised. They perform on a daily basis the most tedious and back-breaking tasks in agriculture, animal husbandry and homes. They are invariably paid lower wages than men for the same agricultural work.
- In farm activities, the percentage of decision making about the choice of subsistence crops to be grown, choice of cash crops, planting trees, labour hiring, purchase of agro- chemicals and quantity of food produce to be sold was highest by males in all sizes of holdings. On the other hand, females were found to be main decision makers only in livestock keeping activities. In Himachal Pradesh, a patriarchal system of society is prevalent where normally decisions are

made by male heads. Hence, despite considerable progress in developing women's capabilities, their participation in economic and political decision making remains very limited.

- Women work both for the labour market as well as for the household sector. Some of this work is recognised and remunerated, whilst most of it is not enumerated and remains unpaid. Women's contribution to the household economy and society goes unrecognised since in most of the activities, female involvement does not enter the sphere of the market and remains non-monetised. Most of the work undertaken by women is often interspersed with other household chores, making it difficult to separate the various tasks performed.
- Non-recognition of women's participation in economic activities is not only an outcome of: (a) their work being intertwined with household activities and (b) being unpaid, making it difficult for enumerators to identify women as workers, but also stems from flawed definitions and the limited scope of economic activity.

3.7 Nutrition Specific/Sensitive Matters

3.7.1 Background

Crop diversity helps ensure not only a stable and sustainable supply of sufficient quantities of food of energy and protein, but also plays a major role in ensuring its quality. Dietary diversity, a direct product of crop diversity is itself considered desirable by nutritionists. New varieties can be developed with improved nutritional quality: with higher levels of vitamins, more readily available iron and other essential elements, better quality protein or with reduced anti-nutritional or toxic factors. There are ample of studies from across the country which show positive association between crop, income and dietary diversity.

Crops introduced under the Crop Diversification Plan (CDP) include some new vegetables which farmers have never eaten or even seen. The view of “food diversification” was then newly introduced in the Project to promote crop diversification. In the context of the Project’s goal and activities some of the activities to improve dietary diversity have been done on topics like: 1) Underutilized/Unknown Crop Promotion: To raise awareness of nutrient values, health effects and cooking ways of crops under-used/under-evaluated as foods (mainly under the CDP) 2) Kitchen Garden Activity: To disseminate information on cultivation tips in kitchen gardens and raise awareness of nutrient values, health effects and cooking ways of new vegetables not listed under the CDP. The activities mainly targeted female farmers, who are the key to go well with home eating, first aiming at promotion of self-consumption at home and expecting to eventually contribute to increase in production, marketing or introduction of the new crops into the CDP. Furthermore, main health issues of the State 1) larger population of obesity and consequent life-style diseases after middle age and 2) increasing female and child population who have anaemia are focused. The following table shows the data of National Family Health Survey highlighting the above stated facts.

Table 3.7.1 Nutritional Status of People in India and Himachal Pradesh

Indicator	India		Himachal Pradesh	
	NFHS-3 (2005-06)	NFHS-4 (2015-16)	NFHS-3 (2005-06)	NFHS-4 (2015-16)
Children under 5 years who are stunted (height for age) %	48	38.4 ↓	38.6	26.3 ↓
Children under 5 years who are wasted (weight for height) %	19.8	21 ↑	19.3	13.7 ↓
Children under 5 years who are severely wasted (weight for height) %	6.4	7.5 ↑*	5.5	3.9 ↓
Children under 5 years who are underweight (weight for age) %	42.5	35.7 ↓	36.5	21.2 ↓
Women whose Body Mass Index is below normal (BMI<18.5kg/m ²) %	35.5	22.9 ↓	29.9	16.2 ↓
Men whose Body Mass Index is below normal (BMI<18.5kg/m ²) %	34.2	20.2 ↓	29.7	18 ↓
Women who are overweight or obese (BMI≥25.0kg/m ²) %	12.6	20.7 ↑*	13.5	28.6 ↑
Men who are overweight or obese (BMI≥25.0kg/m ²) %	9.3	18.6 ↑*	10.6	22 ↑
Children age 6-59 months who are anaemic (<11.0g/dl) %	69.4	58.4 ↓	54.4	53.7 ↓
Non-pregnant women age 15-49 years who are anaemic (<12.0g/dl) %	55.2	53.1 ↓	43.2	53.6 ↑
Pregnant women age 15-49 years who are anaemic (<11.0g/dl) %	57.9	50.3 ↓	38.1	50.2 ↑
Men age 15-49 years who are anaemic (<13.0g/dl) %	24.2	22.7 ↓	18.5	20.1 ↑

Source: National Family Health Survey-4, 2015-16. Ministry of Health and Family Welfare, Government of India.

The highlighted (yellow) figures in the above table shows an increase in percentage of malnutrition in various forms. One of the major causes of anaemia is lack of iron consumption and absorption. This may be due to low iron content of foods consumed or lack in amount/quantity of consumption of iron rich foods or low absorption of iron due to vitamin-C deficiency or worm infestation. Both anaemia and obesity may be related to lack of protein in the diet. Especially in case of obesity due to lack of protein in the diet, appetite for calories from carbohydrate and fat increases.

The diet pattern of people in HP like rest of the country is restricted to 2 - 3 meals a day depending on the season and the work pattern. Staple foods consumed are wheat and rice with inclusion of maize in particular season. The day to day dishes of the people of Himachal Pradesh is very similar to the rest of north India in the sense that they too have dal-chawal-subzi-roti (lentil broth, rice, dish of vegetables and bread). However, one difference is that non vegetarian items are more in-famous here than other north Indian states. Till recently, major vegetables that Himachal people had commonly taken were potatoes and turnips. However, now gradually, green vegetables are making their importance felt more and are getting popular in the diet of people in HP.

A school based cross-sectional study conducted during 2014 - 2015 in rural area of Shimla district revealed 37.9% and 47.7% deficit intake of calorie among boys and girls, respectively. The adolescents also had inadequate dietary intake of vitamins, iron, zinc and calcium.

Another study conducted on food consumption and dietary intakes of farm women of Kangra district of Himachal Pradesh revealed inadequate dietary intake among women. Micro nutrient malnutrition or “Hidden hunger” was very common with all micro nutrients especially iron.

3.7.2 Next Generation Activities and Challenges:

A review of studies related to crop diversity and improved nutrition suggests the following conceptual framework needs to be considered while planning activities.

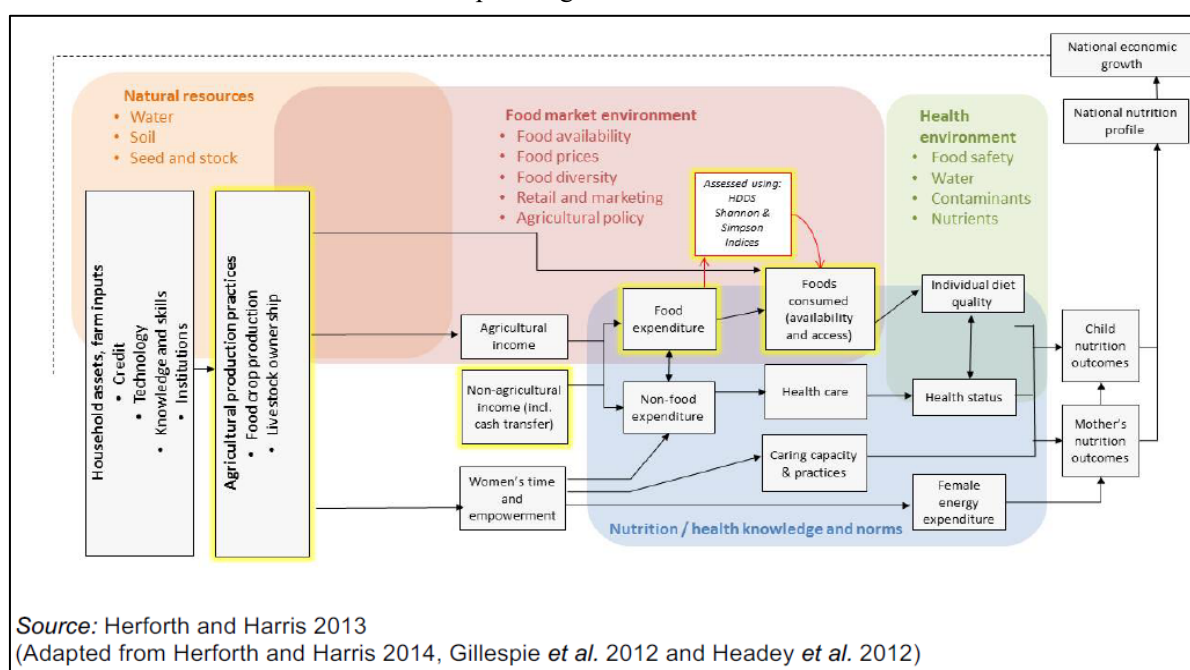


Figure 3.7.1 Conceptual Framework of Nutrition Improvement

Multiple pathways have been proposed for the various ways through which agriculture may plausibly improve nutrition outcomes, and there is now general consensus on a conceptual framework which includes agriculture as a source of food via 1) production for own consumption, and 2) income effect.

The own-consumption pathway applies to scenarios where a household is growing food for own consumption and assumes that production practices have the potential to improve the diversity, nutrient quality, and quantity of foods available to the household year-round.

The income pathway assumes that agricultural earnings— via wages or sale of crops/crop products - are used to purchase not only more food, but more high quality, nutrient-dense food. It also assumes that the additional income may be spent on healthcare as needed, thus increasing the likelihood of positive synergies between improved dietary intake and improved health status.

Production diversification - specifically increased production of nutrient-dense crops and small-scale animal husbandry - is key to both these pathways, first in terms of immediate and fundamental increases in diet quality and diversity, i.e. pathway 1, and second in terms of increased resilience to climate and

price shocks, reduction of seasonal food and income fluctuations, and increased income generation, i.e. pathway 2.

It is clear from the NFHS data and diet pattern of people of HP that there is a need to increase the micronutrients in the diet to improve the nutritional status and in turn the health status of people. Moreover, as we all know that micronutrients also play a very important role in improving the immune system of the body, therefore in current times when the whole world is hit by Covid-19 pandemic, their importance in food increases many folds. Diversification of diet and consumption of a sufficient amount of vegetables also have high possibility to reduce obesity, which is mostly caused by excessive consumption of carbon hydrate and fat caused by unbalanced diet.

Government of India with the support of Bill and Melinda Gates Foundation is developing a Poshan Atlas known as 'Bhartiya Poshan Krishi Kosh' to create a repository of diverse crops across 127 agro-climatic zones of the country. Similarly, in order to improve the nutritional status of the people in HP it is necessary to study the nutrient content of various foods that are generally grown or consumed by the people. The following table gives the information on nutrient content of various foods found in HP. This includes both traditionally grown and consumed foods as well as foods grown in HPCDP II. The heat map in the following table indicates more green means higher content of the nutrient in each category. This may help in making choices of crops suitable to improve the nutritional status. In consideration of the nutritional burden in HP that are remarkable in micronutrient deficiencies and obesity, crops with high content of protein, and vitamin/minerals are prioritised in the selection of crops. Iron is inevitable for improvement of anaemia, while Vitamin C and protein helps absorption of iron in the body. Consumption of adequate amount of protein and vitamins can avoid obesity. Although consumption of dairy products and beans is high in HP, calcium is still important nutrient in growth of children, and vegetables can be a source of calcium with less content of fat.

Table 3.7.2 Nutrient Content of Various Foods Grown under HPCDP II v/s Traditional Foods

Value per 100 gm		Energy (kCal)	Carbohydrate (g)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vit. C (mg)
Recommended Daily Allowance (RDA)	Men	2730	45% to 65% of the total calories	60	30	600	17	40
	Women	2230		55	25	600	21	40
Cereals								
Wheat ^{T,P}		321.94	64.72	10.59	1.47	39.36	3.97	-
Rice ^{T,P}		356.36	78.24	7.94	0.52	7.49	0.65	-
Maize ^{T,P}		764.3	64.77	8.8	3.77	8.91	2.49	-
Oats ^{T,P}		389.3	66.3	16.9	6.9	54	4.7	-
Roots and Tubers								
Carrot ^T		38.2	6.71	1.04	0.47	41.06	0.71	6.76
Sweet Potato ^T		108	23.93	1.27	0.33	28.93	0.51	22.2
Potato ^T		60.9	12.9	1.35	0.22	8.53	0.53	26.41
Turnip ^{T,P}		31	6.07	0.89	0.16	35.76	0.42	15.69
Radish ^{T,P}		32	6.56	0.77	0.15	30.2	0.36	19.91
Beet Root ^T		35.6	6.18	1.95	0.14	17.28	0.76	5.26
Colocasia ^T		88.9	17.85	3.31	0.17	30.18	0.66	1.83
Other Vegetables								
Cauliflower ^{T,P}		22.9	2.03	2.15	0.44	25.16	0.96	47.14
Capsicum ^{T,P}		16.3	1.84	1.11	0.34	14.75	0.48	123
Drum Sticks ^T		29.4	3.76	2.62	0.12	33.3	0.73	71.86
Tomato ^{T,P}		18.9	3.2	0.76	0.25	8.9	0.22	25.27
Okra ^{T,P}		27.5	3.62	2.08	0.22	86.12	0.84	22.51
Brinjal ^{T,P}		34.4	3.49	1.77	0.39	16.59	0.37	2.09
Broccoli ^P		8.1	6.64	2.82	0.37	47	0.73	89.2
Beans ^T		29.4	2.11	3.85	0.15	64.37	0.94	10.98
Onion ^{T,P}		25.6	2.99	2.07	0.26	31.12	3.09	27.23
Green Leafy Vegetables								
Cabbage ^{T,P}		21.5	3.25	1.36	0.12	51.76	0.35	33.25
Bathua Leaves ^T		39.7	2.56	2.5	0.44	211	2.66	41.03
Spinach Leaves ^{T,P}		24.4	2.05	2.14	0.64	82.29	2.95	30.28
Amaranth Leaves Green ^T		30.6	2.28	3.29	0.65	330	4.64	83.54
Moringa Leaves ^T		67.4	5.62	6.41	1.64	314	4.56	108

Fenugreek Leaves ^T	34.4	2.17	3.68	0.83	274	5.69	58.25
Peas (fresh) ^{T,P}	81.2	11.88	7.25	0.13	28.24	1.58	38.4
Mustard Leaves ^{T,P}	30.4	2.41	3.52	0.51	191	2.84	60.32
Cucurbits							
Bottle Gourd ^T	11	1.68	0.53	0.13	15.42	0.26	4.33
Round Gourd ^T	13.9	1.9	1.02	0.17	19.68	0.41	14.2
Ridge Gourd ^T	13.1	1.72	0.91	0.14	13.7	0.42	5.42
Bitter Gourd ^T	20.8	2.82	1.44	0.24	21.36	1.15	46.53
Cucumber ^T	19.6	3.48	0.71	0.16	16.39	0.46	6.11
Fruits							
Apple ^T	64.3	13.99	0.27	0.6	4.72	0.21	4.24
Pear ^T	37.5	8.09	0.36	0.27	6.55	0.28	3.31
Peach ^T	40.2	7.82	0.86	0.37	6.98	0.35	5.49
Mango ^T	50	10.32	0.52	0.53	19.33	0.38	27.65
Guava ^T	32.3	5.13	1.44	0.32	18.52	0.32	214
Grapes ^T	53.5	11.8	0.62	0.26	14.22	0.24	16.47
Litchi ^T	53.8	11.41	0.99	0.26	5.77	0.79	33.82
Papaya ^T	23.9	4.61	0.42	0.16	15.02	0.23	43.09
Banana ^T	110.6	24.95	1.25	0.32	6.77	0.4	8.06
Pomegranate	54.7	11.58	1.33	0.15	10.65	0.31	12.69
Spices and Condiments							
Turmeric ^{T,P}	84.6	64.9	7.83	9.88	183	41.42	25.9
Ginger ^{T,P}	55	8.97	2.22	0.85	18.88	1.9	5.43
Garlic ^{T,P}	122.8	21.84	6.75	0.14	17.63	0.88	13.57
Green Chilli ^{T,P}	42.3	5.86	2.36	0.72	18.45	1.2	94.07
Coriander Leaves ^T	31	1.93	3.52	0.7	146	5.3	23.87
Pulses/ Legumes							
Soya Bean ^{T,P}	377.4	10.16	37.8	19.42	195	8.22	-
Cowpea ^{T,P}	320.3	53.77	21.25	1.14	84.1	5.04	-
Horse Gram (Kulthi) ^{T,P}	329.6	57.34	21.73	0.62	269	8.76	-
Green Gram (Moong) ^T	293.7	46.13	22.53	1.14	92.43	4.89	-
Black Gram (Urad) ^T	291.3	43.99	21.97	1.58	86.18	5.97	-
Bengal Gram (Chana) ^T	287	39.56	18.77	5.11	150	6.78	-
Rajmah ^T	299.2	48.61	19.91	1.77	126	6.13	-
Lentil (Masoor) ^T	297.8	47.91	22.49	0.61	76.13	7.57	-

Note : T= Traditional, P= HPCDP II

Sources: 1. Indian Food Composition Tables, 2017, National Institute of Nutrition (ICMR), 2. USDA National .1Nutrient data base, 3. nutritiondata.self.com, 4. Dietary Guidelines for Indians, National Institute of Nutrition, HPCDP II DPR, Chapter 1-17 vol-1)

As the Poshan Abhiyaan promises to revive the traditional food systems in the country, it is necessary to look at a more local and traditional approach. Activities on crop diversification will significantly contribute in this context. The novelty of Poshan Abhiyaan is twofold- at the agricultural level, it aims to amalgamate knowledge of regional food systems and at the consumer level, to foster social behavioural changes among individuals. Though the introduction of new crop varieties like Broccoli, Kale, Swiss chard etc. to increase food diversity is welcoming but at the same time it is also needed to promote other traditional foods like, Amaranth, Bathua, Methi (Fenugreek leaves), Spinach, Colocasia leaves, Chana leaves etc. Encouraging local women in sharing traditional knowledge of recipes will help in improving participation for the awareness generation campaign. Since social behaviour change is not an easy task if introducing some new variety to the kitchen of the farmers/ community, it will be first needed to know about the already existing practices, appreciate those practices, and then modify intervention according to their requirement, without disturbing or replacing what is already a good practice.

There are different interventions to alleviate micronutrient deficiencies, including (i) food supplementation, (ii) food fortification, (iii) dietary diversification and (iv) crop biofortification, which can be taken as multiple complementary strategies. Therefore, dietary diversification through crop diversification will generate synergy effects on the improvement of micronutrient deficiencies by collaboration with the other approaches.

In a workshop on 'A common vision for tackling malnutrition in India', held by NITI Aayog and IFPRI (International Food Policy Research Institute) in March 2019, one of the recommendations was to increase the micronutrient content of staples through fortification or biofortification. Biofortification, has two key comparative advantages: its long-term cost-effectiveness and its ability to reach underserved,

rural populations. Biofortification is a feasible and cost-effective means of delivering micronutrients to populations that may have limited access to diverse diets and other micronutrient interventions. Coordination with the existing interventions of food fortification and biofortification shall be worth considering in boosting nutrition improvement.

3.7.3 Activities under JICA Technical Cooperation Project (TCP)

(1) Outline of Food Diversification Activities in TCP

In the JICA technical cooperation project (Phase-2 Project for Crop Diversification in Himachal Pradesh) currently underway, food diversification activity is being carried out. Crops introduced under the Crop Diversification Plan (CDP) include some new vegetables which farmers have never eaten or even seen. Lack of farmers' knowledge on new vegetables under the CDP can inhibit promotion of crop diversification. For example, broccoli has recently started to be popularized in India, but it is not much known yet in some areas of Himachal Pradesh, more or less affecting its distribution. The CDP includes crops some areas traditionally cultivate such as soybean. However, as farmers know only a few variations of consuming the crop and many of them give most of it to livestock without consuming by themselves.

The view of "food diversification" was then newly introduced in the TCP to promote crop diversification as the context of the Project's goal. Activities have been done on the following topics:

- 1) Underutilized/Unknown Crop Promotion: To raise awareness of nutrient values, health effects and cooking ways of crops under-used/under-evaluated as foods (mainly under the CDP)
- 2) Kitchen Garden Activity: To disseminate information on cultivation tips in kitchen gardens and raise awareness of nutrient values, health effects and cooking ways of new vegetables not listed under the CDP.

The activities are mainly targeting female farmers, who are the key to go well with home eating, first aiming at promotion of self-consumption at home and expecting to eventually contribute to increase in production, marketing or introduction of the new crops into the CDP. Furthermore, main health issues of the State 1) larger population of obesity and consequent life-style diseases after middle age and 2) increasing female and child population who have anemia are focused.

(2) Progress and Achievements

Following table summarizes the target sites and progress of the activities. During the 1st implementation period (September 2017-January 2019), activities were implemented in two sub-projects as models. Since April 2019, activities have been extended to three other target area in Bilaspur, Nurpur and Hamirpur.

Table 3.7.3 Target Sites and Activities

Implementation Period		Block	Sub-Projects	Activities
1	September 2017 – January 2019	Una	Badhera Lower	Kitchen Garden
		Sarkaghat	Sandral	Underutilized/Unknown Crop Promotion (Soybean)
2	April 2019 – 2021 (on-going)	Bilaspur	Chibberballu, Balh seena, Noa, Ghandhir Jhamrarhian, Domehar and Dhali	Underutilized/Unknown Crop Promotion (Beetroots/Promotion of dried vegetables)
			Balh Seena	Underutilized/Unknown Crop Promotion (Soybean)
		Nurpur	To be determined	Underutilized/Unknown Crop Promotion (Soybean)
		Hamirpur	To be determined	Kitchen Garden

Source: JICA Survey Team

(3) Expansion of TCP Results in the Project

TCP has developed and put into practice a training module for nutrition. TCP also analysed the nutritional value of vegetables, created recipes using highly nutritious vegetables, and distributed them

to farmers. HPCDP II plans to spread these results to the entire project area, and close cooperation between the two projects is desired.

Although school gardening activities are also planned under TCP, it is postponed due to Covid -19 pandemic. It is effective to promote the cultivation and consumption of nutritious vegetables through the school garden. In the school garden program, there are possibilities to involve school and anganwadi to promote school nutrition garden both within curriculum and in extracurricular activities. Collaboration with education and child development sectors should be taken into consideration as capacity development of school and anganwadi teachers would be effective to promote nutrition garden. Nutritional education with cultivation skills for dietary diversification shall be incorporated in the training curriculum of anganwadi and school teachers through collaboration with other sectors.

3.8 Financial Resources for Farmers, Farmers Organisations and Farmers Companies

Although financial resources are inevitable especially for small farmers to sustain their farming activities, their opportunities to access finance have been limited. The following describe the available opportunities and situation of financial sources for farmers as well as farmer groups.

3.8.1 Finance Schemes of Government for Farmers

(1) General

Currently, the credit that farmers often use is Agriculture Loan owned by private banks and Cooperative Banks. Interest rates are set low for farmers, and most farmers who own land use them. In recent years, farmers have used the Kisan Card to obtain this Agriculture Loan loan at ATMs, and the number of Kisan card users reached 400,000 in 2019 which is nearly 41% of total farm household in HP as described below.

(2) National Rural Livelihood Mission

National Rural Livelihood Mission, as a central government scheme, promotes poverty reduction through building strong institutions of the rural poor enabling to access a range of financial service and livelihood services. Banks under this scheme have sanctioned 2,435 loans under this scheme in 2019, covering more than eight thousand beneficiaries in HP (Economic Survey 2019-20)

(3) Kisan Credit Cards

The Kisan Credit Card (KCC) scheme was introduced in 1998, which aims to save farmers from high-interest rates usually charged by money lenders in the unorganised sector and for farmers to meet the short-term credit requirements for cultivation of crops and other needs. The scheme has short term credit and term loans with the interest rate starting as low as 2.00%. This enable farmers to borrow small amounts regularly. Participating institutions include all commercial banks, Regional Rural Banks, and state co-operative banks. In HP, participating banks have financed more than four lakh of farmers under this scheme up to 2019.

3.8.2 Loans for Agriculture Activities

(1) Bank Loans

Agriculture loans are offered by different governmental and commercial banks at lower interest rates compared to other loans in the market, starting from 7.5% per annum. Major agriculture loans are agriculture term loan, agriculture working capital loans, agriculture gold loans and farm mechanisation loan. Leading banks that offer agriculture loans include Central Bank of India, State Bank of India, Union bank, HDFC Bank, Allahabad Bank, Bank of Baroda, Punjab National Bank, ICICI Bank, Axis Bank, and National Bank of Agriculture and Rural Development (NABARD).

(2) Microfinance Institutions (MFIs) / Non-Banking Financial Companies (NBFCs)

A microfinance institution (MFI) is an organization that offers financial services to low income populations to become self-sufficient. Microfinance is increasingly being considered as one of the most effective tools of reducing poverty by enabling microcredit to the financial poor, bridging the gap between the formal financial institutions and the rural poor. MFIs accesses financial resources from the

Banks and other mainstream financial institutions and provide financial services to the individuals or to the groups. These institutions lend through the concept of Joint Liability Group (JLG), an informal group comprising of 5 to 10 individual members who come together for the purpose of availing bank loans either individually or through the group mechanism against a mutual guarantee.

In total 166 MFIs currently operate in 29 States, 4 Union Territories and 588 districts in India. Agriculture sector shares 15% of the income generation loans provided by MFIs. However, MFIs are not widely available in HP, where only 5 MFIs with 7 branches are operating in 4 districts (Bilaspur, Kangra, Una, Jammu District). Average loan per client in HP is also lower than other state of India (Bharat microfinance report 2016).

(3) PACS and SHG

Individual farmers meet their finance needs through short term loan disbursed by PACS as well as inter-lending in SHGs. Several institutions and programmes support and avail loans to community organisations and joint liability groups including PACS and SHGs. Therefore, these community organisations are crucial means for individual farmers to avail short term credit.

3.8.3 Support and Financial Sources for FPOs

Lack of access to affordable credit with requirement of collaterals and credit history is one of the major constraints for FPOs. FPOs are mostly represented by small and medium farmers with poor resource base and hence, initially they are not financially strong enough to deliver vibrant products and services to their members and build confidence. Although government supports incubation of the FPOs, they require support and available sources for their finance for their sustainable development and stability of the organisations. The following are possible financial sources for FPO development.

(1) Support by NABARD

NABARD provides financial and development support to FPOs through the following fund schemes. NABARD created 'Producers' Organization Development and Upliftment Corpus' (PRODUCE) Fund of 200 crores in 2014-15 for building of 2000 FPO in the country supporting their initial financial requirements, to make them credit worthy, commercially vibrant and sustainable business enterprise of farmers. During 2019-20 budget, Central Sector Scheme for Formation and Promotion of 10,000 FPOs over the period of 5 years across the country was launched.

For further development of FPOs, NABARD has set up a Rs.50 crore Producer Organization Development Fund (PODF) for supporting FPOs by providing credit support, improving capacity and building market linkage. The objective of the fund is to meet end requirements of FPOs as well as to ensure their sustainability and economic viability. Activities that fall within the domain of agriculture, allied sectors and non-farm sector are supported under the scheme, and eligible categories for assistance include training/ capacity building, market linkage, administrative cost, incentive for the promoting agency, mobilization of farmers, establishment and registration, training to board of directors, administrative expenses of PO, preparation of DPR and business plan, etc.

In accordance with Central Sector Scheme, NABARD also operates a Credit Guarantee Scheme for FPOs. The scheme is to provide credit guarantee cover (CGC) to all eligible Lending Institutions to enable them to provide collateral-free direct loan to FPOs by minimising their lending risks. This scheme is expected to ensure higher credit flow to FPOs for their business development.

(2) Support by SFAC

The Small Farmers Agribusiness Consortium (SFAC) under the Ministry of Agriculture, Government of India has been taking a major role in establishment of FPOs. Along with the incubation and early stage support, it also provides loan schemes through equity grant fund scheme to improve the working capital and development of business activities. The Equity Grant Fund (EGF) Scheme intends to support FPC to improve its viability and sustainability by providing an amount equivalent to the equity contribution done by the members in the FPCs within the maximum amount of Rs. 10 lakhs per FPC. SFAC also operates the Credit Guarantee Fund scheme of the central sector scheme. FPCs are able to access collateral-free loans through the lending institutions funded by this scheme.

(3) Opportunity for financing to FPOs by Bank

As the FPO progresses from being a start-up entity to a more mature organisation, they build themselves trade ready to attract finance from formal financial institutions and commercial banks. Although eligibility criteria of schemes differ from bank to bank, there are a few banks that provide loan schemes specially for FPOs. Bank of Baroda has a scheme of financing farmer producer companies providing cash credit and term loan for registered FPC with at least six months of operation. Some commercial banks who offer similar financial assistance to FPOs are ICICI Bank, Union Bank of India, Canara Bank, Vijaya Bank, Ratnakar Bank etc. However, there are only a few cases that funded FPOs in these bank loan schemes. Although there are some other financial institutions that provide working capital to FPOs apart from the commercial banks, such as Friends of Women's World Banking (FWWB), Maanaveeya Development & Finance Private Limited, NABFINS and Ananya Finance, NABKISAN Finance Limited (NKFL) etc, they are not in operation in HP.

Chapter 4 Lessons Learned from HPCDP I and Overall Review of DPR

4.1 Outline of HPCDP I

4.1.1 General

For clarification of the exact potential for crop diversification, a two-year study was conducted during the period from 2007 to 2008 supported by Japan International Cooperation Agency (JICA) as grant under bilateral cooperation. The study report contains action plan for ten years and master plan for 15 years for crop diversification in Himachal Pradesh. Based on this study, the Department of Agriculture in the State of Himachal Pradesh proposed a loan project for JICA funding covering five districts of the state with the most potential for crop diversification. The loan agreement of the project was signed in February 2011 with a total project cost of INR 321 crore (loan: INR 266 crore).

The main objectives of the project are to increase the area and production of vegetables through crop diversification; raise income of small and marginal farmers; and create infrastructure for irrigation, farm access roads, marketing, and formation of water users associations (WUAs) to take over the operation and maintenance (O&M) of irrigation systems besides capacity building of farmers and extension officers of DOA.

The project is being implemented in close coordination with the JICA technical cooperation project (TCP) as a comprehensive program.

4.1.2 Rationale of the Project

The rationale of the project is shown as follows:

- Project aims at promoting crop diversification through development of necessary infrastructure and training/capacity building of farmers.
- Project implementation through people participatory mode.
- Community mobilisation and organisation; WUA registered under the Societies Act.
- Enhancing livelihood opportunity through promotion of high value crops, agro-based entrepreneurs and ensuring sound demand-driven marketing system.
- Capacity building of community to take over operation and maintenance.
- Crop diversification model to be perfected for each agro-ecological situation, firstly followed by capacity development of the Project Management Unit (PMU) staff/ farmers.
- Diversification model to be expanded to 210 sites in a phased manner (1st priority: 6 sites, 2nd priority: 23 sites, 3rd priority: 181 sites – 3 batches).
- Project will be implemented in close coordination with TCP as a “comprehensive programme”.

4.1.3 Project Component

Project component is shown as follows:

Table 4.1.1 Project Component of HPCDP I

Items	Components		
Infrastructure Development Component	(1) Development and improvement of minor irrigation system		
	New Development	No.	CCA
	Flow irrigation system	78 sites	1,363 ha
	Lift irrigation system	44 sites	733 ha
	Deep tube well	29 sites	427 ha
	Shallow tube well	21 sites	293 ha
	Sub-total (A)	172 sites	2,816 ha
	Improvement		
	Flow irrigation system	11 sites	513 ha
	Lift irrigation system	27 sites	383 ha
Sub-total (B)	38 sites	896 ha	

	<p>Total ('A+B) 210 sites 3,712 ha</p> <p>(2) Development and improvement of farm access roads</p> <p>Total 147 sites 100 sites</p> <p>(3) Development of micro irrigation</p> <p>Micro irrigation system 52 sites</p> <p>(4) Collection centres 31 sites</p>
Farmers Support Components	<p>(1) Organisation of farmers groups</p> <p>(2) Vegetable promotion training</p> <ul style="list-style-type: none"> - Orientation and needs assessment - Farm economy management training - Introduction of vegetable cultivation (for beginners) - Cropping pattern arrangement (adjustment based on market price, weather condition) <p>(3) Food grains productivity training</p> <p>(4) Promotion of post-harvest technology/marketing</p> <ul style="list-style-type: none"> - Small-scale agro-processing PP mode
Institutional Development Component	<p>(1) Strengthening of DOA</p> <ul style="list-style-type: none"> - Establishment of PMU, Procurement of equipment - Capacity development of PMU staff on PDCA cycle - Establishment of MIS and GIS with staff training <p>(2) Strengthening of extension service function</p> <ul style="list-style-type: none"> - Preparation of extension material - Capacity development of community motivators/extension staff - Strengthening of research-extension-farmers linkage <p>(3) Baseline survey and impact assessment</p> <ul style="list-style-type: none"> - Baseline survey - Mid-term impact assessment - Terminal impact assessment

Source : HPCDP I

4.1.4 Organisation Structure

DOA is fully responsible for the project implementation. The HPCDP I of the project established the Project Management Unit (PMU), with headquarters situated in Hamirpur. The PMU will ensure the smooth implementation of the decision-making process and budgetary appropriations of the project. The Himachal Pradesh Agriculture Development Society has been registered as an autonomous body under the Societies Registration Act. The society has the Governing Council and Executive Committee to take necessary policy decisions. The PMU has three levels that are set up as follows: i) state level (SPMU), ii) district level (DPMU), and iii) block level (BPMU) with different roles and responsibilities as shown in Figure 4.1.1, whilst the current deployment of technical staffs of SPMU, DPMUs, and BPMUs is shown in Table 4.1.2.

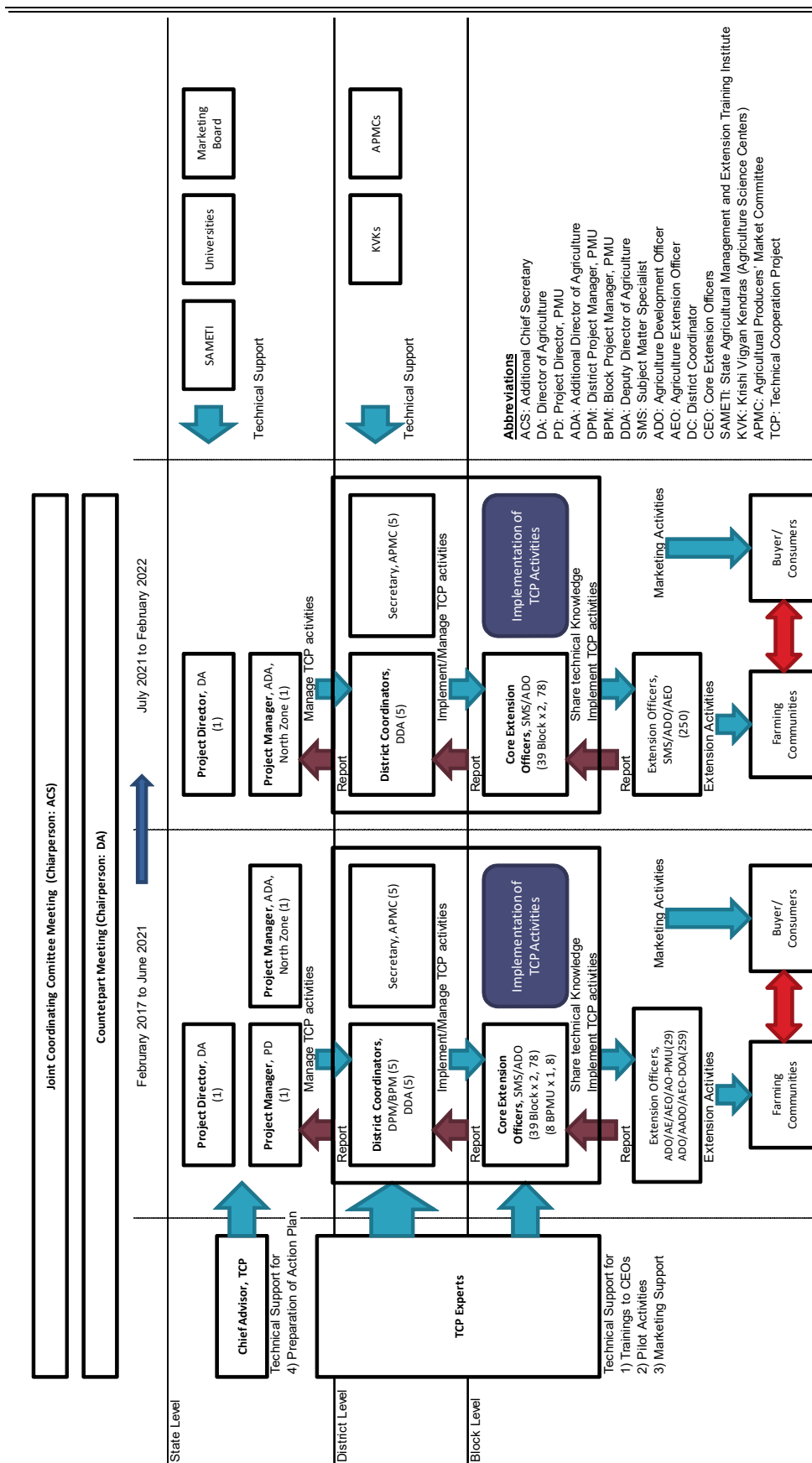


Figure 4.1.1 Organisation Structure

Table 4.1.2 List of Technical Staff in Agricultural Field of PMU

PMU Office	Post	State PMU	District PMU				Block PMU						Total				
			Palampur	Hamampur	Mandi	DPMU Hamampur			DPMU Kangra								
						Hamampur	Bilaspur	Una	Mandi	Sarka ghat	Delhra	Nampur		Bajpath			
State	1 Project Director	Vinod Kumar Sharma														1	
PMU	2 Deputy Project Director (AAE)	Kishore Chand Azad														1	
	3 Dr. Director Agri	Jagjit K Sharma														2	
	4 Deputy Project Director (Engineer)	R.S. Chohan															
	5 SMS	Sumit Choudhan														2	
	6 Assistant Agriculture Expert (Monitoring and Evaluation)	Vishwa Nath Sharma														1	
	Sub-total for State PMU	KC Kapoor														7	
District	1 District Project Manager		Rajesh Chand Sood	Jagdish Chand Ranot	Navneet Sood											3	
PMU	2 SMS		Sapan Thakur (SCTC)	Rakesh Kumar	Hem Raj Sakkani											6	
			Surinder Singh Khalsa	Rajnish Kumar													
			Nagender Nag (SCTC)														
	3 Agriculture Development Officer		Nidhi Rana	Tamanna	Kran Kumari											3	
	4 Agriculture Expert		Swati Sood	Preema Thakur												2	
	Sub-total for District PMUs		6	4	4											14	
Block	1 Block Project Manager					Preem Chand Sharma	Shashi Pal Sharma	Jai Singh	Kulbushan	Ravi Kant	Banbir Singh					8	
PMU	2 Agriculture Development Officer															1	
	3 Agriculture Expert					Nitika Soui	Amit Sharma	Shweta Kumari	Pooja Devi Jyoti	Manisha						7	
							Priyam Chand Sharma	Anoop Kumar									
	4 Agriculture Extension Officer															2	
	5 Agriculture Officer															8	
							Hirani Gupta	Vikram Singh	Rasham Sood	Pooja Devi	Shmita Devi	Pankaj Spsahya	Vikrant Rana			8	
							Jyoti Thakur									2	
	Sub-total for Block PMUs		5	4	4	4	4	3	2	2	3	2	2	3	2	26	
	Grand Total		6	4	4	4	4	3	2	2	3	2	2	3	2	47	
	CEOs		5	3	3	3	3	3	1	1	2	2	2	2	2	29	
	No. of Sub-project areas					33	18	19	33	29	21	25	32	210		210	
Note) outsourcing or comprehensive contract basis (re-employment)			Name in red color: Female staff			DOA regular Staff : 28			Outsourced Staff : 19			Male Staff: 28			Female Staff : 19		
Source) List of Staff, HPCDP JICA ODA, Hamampur (as of May 2020)						DOA regular CEOs : 10			Outsourced CEOs : 19			Male CEOs : 12			Female CEOs : 17		

4.2 Overall Assessment of HPCDP I

PMU reports innovations and lessons learned in the project as follows:

Community participation during planning, execution, and O&M of irrigation systems.

Water users' associations (KVAs: Krishak Vikas Associations) are doing bara-bandi (water distribution) and collecting water charges. Community has the ownership of the irrigation system.

Introduced solar water pumping system in 70 sub-projects thereby reducing O&M cost to the farmers.

In lift and tube well irrigation systems, irrigation efficiency has been increased by 40% to 60% through micro irrigation system.

Convergence of schemes of the Department of Agriculture and Irrigation in the project area has been ensured to have a greater impact.

Farmers organisations and self-help groups (SHGs) have started economic activities to supplement income and now have been federated at the cluster, district level with an apex body at the top.

With assured irrigation, farmers are shifting to vegetable cultivation; and sizeable area has been brought under commercial crops.

Productivity of vegetables has increased from 10 tons/ha to 18 tons/ha and cereals from 1.8 tons/ha to 2.6 tons/ha.

Poly house cultivation has been introduced in the project to supply quality planting materials and precision farming.

New machineries suitable for hilly areas like power tiller, power weeder, motorised reaper, bush cutter, earth auger, etc. have been introduced through KVAs on custom hiring and to group farmers.

All infrastructure works are being completed within the original cost estimate.

TCP of JICA is also operating and supporting the loan project to introduce and standardise innovations in increasing efficiency and farm income.

Furthermore, the impact survey for Mandi District concluded that project implementation has remarkably increased irrigated area, facilitated diversification through vegetable crops, increased degree of mechanisation, and facilitated development of rural infrastructure/organisations in the project area, as shown in the following table:

Table 4.2.1 Performance Rating with Respect to Delivery of Inputs and Implements in the Project Area

Sr. No.	Particulars	Response (%)		
		Very Good	Good	No Change
1	Land development/fencing	10.0	10.0	80.0
2	Increase in irrigated area	75.0	20.0	5.0
3	Addition of new crops	87.5	5.0	7.5
4	Farm mechanisation achieved	70.0	12.5	17.5
5	Timely inputs delivery	67.5	20.0	12.5
6	Quality inputs supplied			
i	Seeds	80.0	20.0	-
ii	Fertilisers	10.0	15.0	75.0
iii	Chemicals	22.5	5.0	72.5
7	Quality of trainings			
i	Crops	70.0	22.5	7.5
ii	Livestock	87.5	2.5	10.0
8	Implements/machinery provided			
i	Service of power tiller/ tractor	67.5	20.0	12.5
ii	Irrigation pipes	70.0	-	30.0
iii	Sprinkler system	42.5	27.5	30.0
iv	Non-conventional energy (solar) system	-	30.0	70.0
9	Market outlet and organisations developed			
i	Collection centres	50.0	-	50.0
ii	Rural roads	75.0	-	25.0
iii	Performance of KVAs	57.5	5.0	37.5
iv	Formation of SHGs	67.5	20.0	12.5

Source: Study on Comparative Economic Analysis of Crop Diversification between Project and Non-Project Areas in Mandi District, 2020, HPCDP I

Furthermore, the impact survey for HPCDP reports some suggestions and lessons learned as follows:

- There has been significant improvement in the irrigated area and extent of diversification with vegetable crops in the project sites. The productivity, farm production, and marketed surplus also increased. Therefore, there is a need to expand the HPCDP domain to other villages and regions in different districts of Himachal Pradesh. The HPCDP has been quite successful due to convergence of field functionaries in the execution of the programme, which is a lesson worth emulating for the execution of other schemes. There is also a need to include land development and fencing as one of the project activities under HPCDP.
- There is a need for the involvement and more participation of farmers in the design and execution particularly in laying out the irrigation channels/pipes and location of water tanks/distribution points so that equitable distribution of irrigation water will be made in the command area. The cleaning and de-siltation of tanks and channels need to be given attention by KVAs and beneficiary farmers. Similarly, at high pressure points, galvanised iron (GI) pipes, collars, and joints need to be used. Moreover, for efficient use of irrigation water, drip and sprinkler system can be installed wherever feasible.
- After completion of the project phase, sustainable use and maintenance of infrastructure, support services, and machinery would be a main concern. So far, the Krishak Vikas Association (KVA) system has been successful with supervision and guidance from the experts. There is a need to put in place an effective system involving government officials and KVA members to maintain the overheads created in the project.
- The mechanism of user charges for irrigation facilities and machinery is quite innovative to generate sufficient revolving fund for meeting the operational expenses. However, there is a need for rationalisation of user charges particularly for hiring tractor/power tillers provided under HPCDP. Some of the farmers suggested that the charges were on the higher side (INR 400-500/hour) and need to be reduced to INR 300/hour.
- The training and capacity building programme has been quite successful in creating awareness about package of practices, improved management, and preparation of value-added home products. The formation of women SHGs has been quite successful. There is also a need to train them in enterprises like mushroom production, bee keeping, poultry farming, etc. to supplement their income. It is suggested that farmers may be encouraged to form groups or FPOs to increase bargaining strength and market the produce efficiently. The effective and efficient use of collection centres would be better achieved through such efforts.
- Moreover, facilities like cold storage, mechanical weighing, and grading and packaging are yet to be developed at the collection centres to modernise marketing.
- Solar energy is regarded as the future energy system; therefore, harnessing solar energy has a great potential not only to reduce energy cost but also to protect the ecology and environment. The two solar energy systems installed in the project area were not being used to the potential levels. The concerned companies are providing repair/maintenance services.
- During the survey, it has been found that KVA members and SHGs need more training in records keeping and maintaining accounts. Therefore, KVA members and women SHGs need to be trained in bookkeeping and accounting thereby facilitating transparency in the collection of user charges and utilisation of funds.
- By adopting Society Mode during the implementation period, the project activity became an activity independent of DOA. As a result, cooperation between conventional work and project work was not created, and questions remained regarding the maintenance of project results.

4.3 Extracted Lessons from HPCDP I

Consideration of the project lessons learned is valuable and a useful activity. This consideration is required to be conducted not only at the time of completion but also going through the future phase. It is assured that we need to keep the lessons learned in the HPCDP I and utilise them for the implementation of HPCDP II.

Major lessons learned from HPCDP I are shown as follows:

4.3.1 General

(1) Minimisation of vacant posts of extension officers

Current situation: Some sanctioned posts in SMS offices of Deputy Director of Agriculture (DDA) remained vacant.

Cause: It is caused by limited budget.

Prospect for the solution: For effective transfer of agricultural technology to the farmers and monitor the progress, the DOA should fill up the vacant positions of Extension Officers (EOs).

Future plan: Field extension activities are carried out by Agriculture Extension Officers (AEOs) in the AEO circle. In the state, it is claimed that around 40% of the positions of AEOs are vacant. Urgent position of AEO should be filled out.

(2) Minimisation of EO replacement and outsourced extension staff recruitment

Current situation: In case of DOA regular staff, they are transferred to other places through ordinary promotion system, despite their strong intention to stay at the same position.

Meanwhile, it is believed that around 50% of field extension officers in DPMUs and BPMUs are recruited from an outsourcing agency on yearly contract and after each year, the contract is renewed. Generally, those outsourced extension officers have uncertainty in their mind and always look for other opportunities outside the project. Many outsourced extension officers after working for some time/year leave the project.

Cause: There are some different perceptions on the implementation of extension activities between DDA offices and PMU offices.

Prospect for the solution: It is expected that personnel rotation should be arranged, considering the respective situation.

Future plan: Arrangement of contractual basis staff and minimisation of recruiting outsourced extension staff should be considered. Contractual basis staff is already considered in DPR; however, it is not sure that this arrangement will be approved.

(3) Application of PDCA in extension activities

Current situation: It is proposed that all extension activities should be conducted by applying the Plan, Do, Check, and Act (PDCA) cycle. In HPCDP I, extension officers have tried to prepare action plans. However, outputs of each extension activity are not clear, so that it is not possible to check its impact. The JICA TCP Expert Team has proposed DOA and PMU to prepare action plan with purpose, activities, and outputs.

Cause: There are no clear instructions.

Prospect for the solution: It is necessary to educate them on the importance of the PDCA cycle.

Future plan: Preparation of action plan applying PDCA should be well disseminated.

(4) Prioritisation of area and beneficiaries for implementation of effective extension service

Current situation: There are various issues surrounding extension activities. DOA is also having the responsibility of supplying agricultural inputs viz. seeds, pesticides, implements, and machinery through the input supply centres to the farmers of the area. Most of the time, the EOs are busy in arranging, supplying and settlement of accounts of these inputs and thus limited time is left for extension activities in the field.

For the development of the agriculture sector and welfare of the farming community, the DOA is also implementing many central-supported and state-supported new schemes; thus, the same EOs are responsible for the

implementation/execution of such programs in the area.

In this situation, the DDA office should prioritise the area and the farmers concerned for extension activities. It is difficult to cover all areas and all farmers as well.

Cause: There is no practical plan for extension activities.

Prospect for the solution: They have to clarify the target and outputs of their activities.

Future plan: 1) Selection of priority area and farmers.
2) It is required to clarify the target and outputs of their activities.

(5) Monitoring of extension activities

Current situation: EOs working in the DOA blocks are implementing the extension activities on the basis of input (target) – output (achievement) approach.

Cause: They have little idea of applying the PDCA cycle, which provides a methodical approach to problem solving and continuous improvement.

Prospect for the solution: PMU has recommended regular monitoring of extension activities in a way of Input-Output-Outcome. The monitoring of outcome (impact) helps in analysing the success/failure of the activity done.

Future plan: It is proposed that the current situation be improved through actual practices to achieve the prospects mentioned above. They have some activities to prepare detailed plan for extension activities; therefore, it takes time to apply PDCA in their activities.

4.3.2 Farming

(1) Sharing data and information

Current situation: For sharing learnings and technical materials received by the CEOs during any training program, it was emphasised that the training materials (hard/soft copies) be shared with other EOs and be kept in the offices for future reference. Most of the District Coordinators (DDAs/PD, ATMAs, DPMs/ BPMs) have tried to identify safe spaces (almirah/shelf, etc.) and started to keep the materials in those places. They have also started to share the learnings by including them on the agenda items in their monthly/periodical staff meetings. PMU could not share their experience and knowledge on farmers' organisations and promotion of crop diversification. Therefore, it is recommended that staff assigned in the project should be deployed for certain period and frequent shifting should be avoided, in order to enhance the capacity building of extension officers.

Cause: Sharing data and information in offices concerned is not so common.

Prospect for the solution: It is proposed that sharing the system of knowledge database such as office library/filing system, regular technical meeting, etc. should be arranged in each office. Further, it is proposed to adopt SNS system to keep close communication amongst extension officers. In HPCDP I, PMU already arranged this SNS system for daily reporting from each extension officer to senior staff of PMU that is PD, DPD, DPM, and BPM.

Future plan: To share data and information through regular meetings (monthly and weekly)

(2) Capacity building

Current situation: Extension officers do not have sufficient knowledge on crop cultivation, and therefore could not conduct proper trainings for farmers.

Cause: Training programmes for the extension officers are confined to selected extension officers. Their skills and experiences are not shared because those

data and skills are defined as private property.

Prospect for the solution: Training on capacity building of extension officers should be shared through circulation of report or presentation in regular meetings.

Future plan: Participants should be instructed to share their skills and experiences to be obtained in training programme with other extension officers.

(3) Preparation of future plan

Current situation: Farm materials, machinery, and relevant facilities such as poly houses have been distributed to farmers without farm business planning, but just judging the financial implications.

Cause: There are no guidelines to instruct applicants to prepare any kind of business plan.

Prospect for the solution: Introduction of application system of materials and machinery.

Future plan: Training for the preparation of business plan should be included.

4.3.3 Marketing

(1) Capacity building of extension officer on practical marketing activity

Current situation: Marketing trainings have not been conducted in HPCDP I.

Cause: Priority subject on vegetable promotion in crop diversification is to improve productivity of food grains and vegetables.

Prospect for the solution: Awareness on the importance of marketing and farmer's support on the establishment of linkage between production and marketing (e.g., Dissemination of marketing information such as price trend, buyers and markets; and Business matching between farmers and buyers).

Future plan: 1) Preparation of practical training of extension officers regarding marketing activities; and
2) Set up of training for farmers on marketing (awareness creation, business planning).

(2) Improvement of job profile for extension officers

Current situation: Implementation of marketing activity is not mentioned in the job profile of extension officer.

Cause: Generally, extension officers of DOA have no responsibility of extension activities regarding marketing, as there are no particulars of extension activities on marketing in their job profile.

Prospect for the solution: Addition of the content on implementation of marketing activity to the job profile.

Future plan: 1) Improvement of job profile for extension officers
2) New establishment of section/unit for supporting sales of products

(3) Collection and delivery of information about potential buyers by BPMU

Current situation: It is required to identify traders who market exotic vegetables and to get information about traders' demand and required conditions to do business with them. In this case, BPMU is expected to have some proactive role to collect related information. Unfortunately, many of the collected information were incomplete and second-hand. Perhaps, BPMU staff had no clear understanding what is useful information.

Cause: BPMU staff has less experience in creation of business relationship, i.e., starting business between target farmers and potential buyers by giving information and other assistance.

Prospect for the solution: It is expected that their capability be improved through actual activities with the JICA TCP experts.

Future plan: If steady business relationship is made, it will become a successful experience for the BPMU staff; and the next supportive activity at other sub-projects and with other buyers must be considered

4.3.4 Infrastructure of Irrigation Facilities/ O&M

(1) Additional job profile on technical extension service for water management

Current situation: In principle, DOA covers the responsibility up to handing over of irrigation facilities. Therefore, O&M activities were not conducted sufficiently. Further, guidelines on water management and O&M after handing over of irrigation facilities are not available.

Cause: There are job profiles on technical extension services since irrigation facilities are handed over to water users' association.

Prospect for the solution: Roles of DOA's staff in monitoring of KVA's maintenance activities have to be defined.

Future plan: Responsibility after handing over the irrigation facility should be defined in the job profile of staff assigned under the Sub-divisional Soil Conservation Officer's Office.

(2) Training of farmers on water management and strengthening of KVA

Current situation: Some farmers did not use irrigation facilities and were not interested in O&M activities.

Cause: Farmers have less information, and no technical support since handing over of irrigation facilities.

Prospect for the solution: Responsibility of O&M monitoring by KVA shall be clarified.

Future plan: 1) O&M manuals for farmers are prepared and training to farmers is conducted.
2) Awareness training on O&M of irrigation facilities to farmers is conducted repeatedly.

(3) Utilisation of checklist for water management and O&M

Current situation: EO or JE's capacity on supervision to service provider's planning, installation, and technical support was not enough.

Cause: EO or JE has less skills and experiences regarding planning and installation.

Prospect for the solution: Capacity building training for construction and installation work should be conducted.

Future plan: 1) Checklist is prepared and used.
2) Documents have to be kept for all certification work.

4.3.5 Food Diversification / Livelihood Improvement / Gender / Social Inclusion

(1) Involvement of extension officers

Current situation: Involvement of extension officers is priority subject in order to disseminate activities for the improvement of livelihood and nutrition; furthermore, it will promote crop diversification.

Cause: This topic is new to them.

Prospect for the solution: It is expected that instruction materials will be improved such as using flipcharts having front sides for farmers and back sides for officers so that even unexperienced officers can easily instruct farmers.

Future plan: It is proposed that the current situation be improved through actual practices to achieve the prospects mentioned above.

4.4 Overall Review of DPR

Review results of DPR are described in Table 4.4.1. Further, some tips are summarised as follows:

- Nomination of nodal officers for each activity to be conducted by HPCDP Phase-2
- Close communication amongst HPCDP Phase-2, DOA, and other institutes concerned is expected.
- Subjects and budgets to be flexible
- All activities to be conducted in the project should be arranged, depending on the needs and requirements of the beneficiaries. If some subjects are less or more required, their activities should be flexibly modified. Meanwhile, budget should also be flexible, depending on the progress of budget consumption.
- Necessity of stakeholders' orientation just before the implementation of the project.
- It is expected that orientation of all stakeholders should be arranged before implementation of the project in order to ensure close coordination.
- Implementors to be clarified
- In DPR, implementors for some subjects are not yet decided.
- Operation and maintenance (O&M) plan
- It is necessary to prepare O&M plan to manage the facilities (irrigation facilities, MIS, etc.), farm machinery, and other infrastructure (storage, collection centre, etc.). O&M plan should be prepared before commencement of operation.

Table 4.4.1 Review Results of DPR

Subjects (page in DPR)	Particulars in DPR	Reviewed Points
1. Context / Background of the Project (pages 1-20)	-	No points to be reviewed so far.
2. Problems to be Addressed (pages 21-26)	-	<ul style="list-style-type: none"> • The content of the problem is not organised as a whole. Four points are listed as central problems, but each one contains the content and is difficult to understand. • Regarding employment generation, the necessity should be made clearer. Whilst it is said that employment is necessary, there is a labour shortage. • Regarding the current issues, in line with the strategy of HPCDP Phase-2, this will be easy to understand when the infrastructure, farm management, value chain and marketing, and government extension system are arranged. The issues on the lessons learned in HPCDP I will be organised and added. It is also necessary to list the extraction of issues regarding gender and nutrition.
3.1 Objectives (page 27)	<p>The following are listed:</p> <ul style="list-style-type: none"> • Promote sustainable crop diversification • Development and rehabilitation of minor irrigation facilities • Farm access roads • Value addition and market development • Improvement of extension services • Improvement in farm income 	<ul style="list-style-type: none"> • The six points listed at the beginning are causal to each other and need to be organised. • Considering the diversity of activities (livelihood activities, etc.), the income target should be farm household unit. • It is not necessary to give an outline of the activity here. Objectives should be stated more clearly. • Regarding the target value of income, an appropriate value should be considered in terms of policy, comparison with other sectors, and achievement level in HPCDP I.
3.3 Project Purpose (page 28)	<ul style="list-style-type: none"> • To increase income per unit area by crop diversification • Sustainable growth of agriculture sector thereby ensuring prosperity of small and marginal farmers of the state. • Organisation of farming community into commodity-based group farming and marketing. Knowledge and skills enhancement of farming community for the adoption of agro-processing for value addition and micro-enterprises. 	<p>Modified purposes are shown as follows:</p> <p>(1) To increase income per unit area by crop diversification</p> <p>(2) To increase employment opportunities</p>

Subjects (page in DPR)	Particulars in DPR	Reviewed Points
	<ul style="list-style-type: none"> • Human resource development, capacity building, and development of planning capability of extension officers. • To provide infrastructure and capacity building regarding post-harvest marketing, processing, value addition, cold storage and cold chain. 	
3.4 Project Outputs (page 28)	<ul style="list-style-type: none"> • Higher income per unit area per unit time by growing cash crops. • Increased employment opportunities. • Efficient and scientific use of natural resources such as soil and water thereby increased productivity. • Utilisation of soil and water for crop diversification policies as per the existing capability and potential. • Improvement in quality of produce through post-harvest value addition. • Reduction in wastage which is about 30% at present in vegetables. • Increase in irrigation efficiency and irrigated area. 	<p>Project outputs should be specified, considering four project components:</p> <p>(1) Increase in irrigation efficiency and irrigated area</p> <p>(2)-1 Increase of productivity of crops</p> <p>(2)-2 Organisation of farming community</p> <p>(3)-1 Selling agricultural products at higher price</p> <p>(3)-2 Reduction in wastage which is about 30% at present in vegetables.</p> <p>(3)-3 Improvement in quality of produce through post-harvest value addition.</p> <p>(4) Improvement of capability of extension officers</p>
3.5 Project Components (page 28)	<p>(1) Infrastructure development</p> <p>(2) Farm support component</p> <p>(3) Institutional development</p> <p>(4) Value chain, market development</p>	No points to be reviewed so far.
4. Target Beneficiaries (page 35)	4.1 Selection of sub-projects	No points to be reviewed so far.
	4.2 Beneficiaries	<p>Whole time farmers might be minor, according to the sample survey. Considering the diversity of activities, the farmers involved in the production and sale of vegetables should be organised into groups to some extent.</p> <p>1) FPO</p> <p>2) KVA (Landless farmers are included ?)</p> <p>3) SHGs</p> <p>4) Private enterprises</p>
	4.3 Impact of the project on the weaker	No points to be reviewed so far.

Subjects (page in DPR)	Particulars in DPR	Reviewed Points
	sector of the society	
5. Project Strategy (page 37)		In particular, other miscellaneous activities, innovative activities, and livelihood support activities included in the Farmers Support Program component and value chain and marketing activities should be clearly defined in the strategy.
6. Legal Framework (page 39)	Implementation of the project shall be through Himachal Pradesh Agriculture Development Society which has been registered under the “Societies Registration Act”.	<ul style="list-style-type: none"> • The advantages and disadvantages of HPCDP I conducted by the Agriculture Development Society should be summarised. • By using the Society Mode, there is a separation between normal work and project work within DOA. It should be written how to mitigate such separation during and after the project.
7. Environmental Impact Assessment (page 40)	<ul style="list-style-type: none"> • For this project, EIA and IEE are not required. 	<p>Review of the EIA Notification Referring to the EIA Notification (2006), all projects and activities are broadly categorised into three categories, Category A, B1 and B2, based on the spatial extent of potential impacts on human health as well as natural and man-made resources. In case a project is classified as Category B2, environmental survey and environmental clearance issued by the State Environment Impact Assessment Authority are not necessary. The project has several activities, e.g., installation of irrigation system and introduction of new crop, but the area of the subproject is not large, about 100 ha; therefore, the project might be classified as Category B2. However, improvement of agricultural chemicals (pesticide and fertiliser) may cause deterioration of groundwater. Introduction of facility may cause air pollution and noise. Thus, environmental and social impacts should be considered after the selection of subproject with further information.</p> <p>Review of the JICA Environmental and Social Consideration Guidelines JICA has classified the project as Category B. The JICA Guidelines require IEE for Category B projects. This project aims to be funded by JICA; it is deemed that IEE is basically necessary.</p> <p>In the meantime, as final location and contents of the subprojects would not be determined before the JICA loan agreement, IEE cannot be conducted during F/S stage. The F/S will review the environmental and social impact assessment framework formulated in HPCDP I and collect information on environmental and social considerations so that necessary environmental and social considerations will be taken just after specifying the subprojects. If a subproject is regarded as Category A or B, the project will conduct environmental and social considerations study.</p> <p>Review of the TOR of the JICA Survey The TOR requires to prepare the criteria for selection of subproject from the viewpoint of environmental and social considerations and establishment of environmental and social impact assessment framework. Classification of the category for each subproject and necessary environmental and social consideration measures are determined/prepared through two steps, i.e., the F/S period and detailed design period, in accordance with the TOR. Hence, it is difficult to determine the necessity of environmental and social study during the F/S stage, and the decision will be made after the selection of the subprojects using the framework.</p> <p>Conclusion DPR mentions that EIA and IEE are not necessary with preliminary screening even though present situations at sites and original designs are not clear. After the selection of the subprojects with original designs, screening at each subproject must be implemented; therefore, the F/S survey should collect environmental and social information and predict possibly necessary procedures to make provision for smooth implementation of the project.</p>

Subjects (page in DPR)	Particulars in DPR	Reviewed Points
8. On-going Initiatives	-	Items that should be organised and described in the first part as the project background.
9. Technical Issues	-	Reconsider the need for description.
10. Management Arrangement	-	Regarding the implementation system, it follows HPCDP I. Regarding the number of staffs, the number of staffs will be scrutinised from the consistency with HPCDP I Currently, 60 employees are dispatched from DOA (out of the total of 441 employees). Discuss whether there is a seconded person from other related organisations (HPSAMB)
11. Means of Finance and Project Benefit (pages 52-122)	11.1 Infrastructure Development Component	
	11.1.1 Minor Irrigation	Number of subprojects and Cultivable Command Area (CCA) shall be updated in each sentence.
	11.1.2 Micro Irrigation Systems (Attachment 7)	Survey, planning, designing and estimation of systems shall be done by the service provider and it shall be supervised by EO or JE. It should be managed rightly as proper type and system would be installed. The guidelines and checklist, which are prepared in the HPCDP I, shall be used. Target CCA of 3200 ha of sprinkler methods of irrigation is not explained. If MIS is already planned to be installed, water distribution tank and booster pump should be planned together with minor irrigation scheme.
	11.1.3 Catchment Area Treatment (Attachment 8)	Target catchment area of 3000 ha is not explained. Projection of the area or number of structures shall be shown and the cost shall be calculated based on the projected quantity in the number of structures.
	11.1.4 Solar Pumping	It is planned to install solar pumping system to cover 50% of the area but the meaning of 50% was not explained. It will be revised to the proposed quantity. For cost estimation, expected area in ha which covers 50% under LIS and STW and rate of 1.15 lakh/HP are multiplied. It should be calculated as per number of facilities with the representative solar pump capacity.
	11.1.5. Farm Access Roads	It is proposed to construct/rehabilitate 100 nos. of farm access roads from existing road linkages covering 80 km in 12 districts, but it will be revised to the proposed quantity.
	11.1.6 Solar/Electric Fencing for Protection of Vegetables and Food Grains	It is proposed that solar electric fencing shall be created in 1000 ha area (400,000 running meter) based on the experience of the HPCDP I; however, the meaning of the estimated quantity is not explained.
	11.1.7 Survey, Investigation, Designing and Estimation	Specific survey such as groundwater level, needed volume and type of MIS, existing of the project under IP&H or E&F department, etc. should be mentioned.
	11.2 Farmers Support Program Component	
	1. Vegetable Promotion	Implementor: extension officers of PMU Budget on training of extension officers to be included in the project
	1.1 Orientation and Needs Assessment	No issues. Implementors to be clarified such as institutes, university, NGOs, etc.
1.2 Farm Economy Management Training	No issues. Implementors to be clarified such as institutes, university, NGOs, etc.	

Subjects (page in DPR)	Particulars in DPR	Reviewed Points
	1.3 Cropping Pattern Arrangement	No issues. Implementors to be clarified such as institutes, university, NGOs, etc.
	1.4 Cultivation Practices	No issues.
	1.5 Promotion of Organic Farming	No issues. Implementors to be clarified such as institutes, university, NGOs, etc. Cost to be reviewed later.
	1.6 Food Grains Productivity Improvement	No issues.
	1.7 Integrated and Organic Pest Management	No issues.
	1.8 Agriculture Mechanisation Custom Hiring Centre Subsidy (80%) for Farmers	No issues. Farm machinery and equipment to be authorised by DOA. Business (management) plan to be required before provision. Basis of nos. (Annexure B) Category and quantity to be flexible. Conditions (price, subsidy, etc.) to be the same with the existing schemes.
	1.9 Promotion of Protected Cultivation in Poly House and Low Tunnels Naturally Ventilated Greenhouse Low Tunnel Walk-in Tunnel	Type and size to be authorised by DOA. Business (O&M) plan to be required before provision. Same condition with the other schemes to be required.
	1.10 Promotion of Post-harvest, Marketing and Value Addition	No particular issues. Basis of nos.
	1.11 Program for Next Generation (page 84)	Implementors to be clarified such as institutes, university, NGOs, etc. Basis of no. and unit cost
	1.12 Engagement of Community Motivator	Implementors to be clarified such as institutes, university, NGOs, etc. Basis of no. and unit cost
	1.13 (Additional) Formation and Capacity Development of KVA	To be added.
	1.14 (Additional) Water Management after Handing Over	To be added. Checklist to be used.
	2. Other Activities 2.1 R&D Support	Key persons for preparation of CDP must be farmers (beneficiaries) in each subproject. POP should be prepared in the university not in the project Standard guidelines should be updated. Breakdown of the cost to be required.
	2.2 Public Private Participation	Breakdown of the cost to be required.
	2.3 On-farm Testing of Soil Health	No particular issue. Breakdown of the cost to be required.

Subjects (page in DPR)	Particulars in DPR	Reviewed Points
	2.4 Creation of Infrastructure for Vegetable Seed Production in the SAU	Under review.
	3. Innovative Activities 3.1 Establishment of Centre of Excellence for Vegetable Nursery Production	No issues. Breakdown of budget Place to be proposed. O&M plan, subsidy
	3.2 Introduction of Soil Less Cultivation-Hydroponic Farming	No issues. Breakdown of budget. Place to be proposed. O&M plan, subsidy
	3.3 Promotion of Tubular Structure Shade Net Houses for Vegetable Production	No issues. Breakdown of budget. Place to be proposed. O&M plan, subsidy
	3.4 Plastic Mulching for Crop Production	No issues. Breakdown of budget. No procedure on selection of users. Disposal method (solution)
	3.5 Provision of Anti-hail Nets in Hail Prone Areas	No issues. Breakdown of budget. No procedure on selection of users. Disposal method (solution)
	4. Livelihood Support Activities	No issues. Implementors to be clarified such as institutes, university, NGOs, etc. Section in charge in DOA Breakdown of budget including administrative cost for implementors. Procedure on selection of users to be specified. Flexible change to be required, depending on needs or requirement. Difference between 1.9 (page 81) and 4.5 (page 104)
	11.3 Institutional Development Programme	Relevant sections in DOA to be established for sustainable management. To mitigate disadvantageous points to employ Society Mode should be highlighted more.
	11.3.2 Strengthening of Extension Service Function	Budget for TOT to be included. It is attempted that ADO and AEO are trained in cooperation with resource agencies, as Training of Trainers (TOT)
	11.4 Value Chain, Market Development	Whilst DPR originally has a plan to establish new <i>mandis</i> in four locations, HPSAMB has offered to replace the plan with a new one to develop 16 facilities for post-harvesting and value addition at respective <i>mandi</i> sites as shown in the following table.

Subjects (page in DPR)	Particulars in DPR	Reviewed Points						
		No	Dist.	Site	Produce	Proposed Infrastructure	Capacity (MT)	Operation & Management
		1	Shimla	Sandhu	Apple	Apple cold chain	27,937	HPSAMB PMU- Private lessee & Farmers' Organisation
		2	Shimla	Anu	Apple	Apple cold chain	28,890	HPSAMB PMU- Private lessee & Farmers' Organisation
		3	Shimla	Sandhu	Cherry	Hydrocooling and Packhouse	7	HPSAMB PMU- FPO/SHG
		4	Kinnaur	Philingi	Apple	Apple cold chain	4,832	HPSAMB PMU- Private lessee & Farmers' Organisation
		5	Solan	Kandaghat	Tomato	Tomato Processing	6.67 MTPD	HPSAMB PMU- Farmers' Organisation
		6	Solan	Chakkimod	Fruits	CA storage	5,179	HPSAMB PMU- Private lessee & Farmers' Organisation
		7	Sirmaur	Poanta Sahib	Rice	Rice Sheller	81.33 MTPD	HPSAMB PMU- Farmers' Organisation
		8	Sirmaur	Nauradhar	Garlic	Processing unit, Packhouse including grading and packing	8.1 MTPD	HPSAMB PMU- Farmers' Organisation
		9	Lahual & Spiti	Kukumseri	Vegetables	Packhouse for offseason vegetables	173.16	HPSAMB PMU- Farmers' Organisation
		10	Kullu	Patlikul	Apple	Apple cold chain	16,865	HPSAMB PMU- Private lessee & Farmers' Organisation
		11	Kullu	Khegsu	Fruits	CA storage and Packhouse including grading and packing	5,424	HPSAMB PMU- Private lessee & Farmers' Organisation
		12	Mandi	Karsog	Vegetables	Packhouse	151.04	HPSAMB PMU- Farmers' Organisation
		13	Kangra	Jasoor	Kinnow	Kinnow processing unit	6.86 MTPD	HPSAMB PMU- Farmers' Organisation
		14	Bilaspur	Nihal	Fish	Market yard	650 MT	HPSAMB PMU- Private lessee & Farmers' Organisation
		15	Hamirpur	Hamirpur	Fruits, Vegetables	Market Logistics Support	10.8 MT	HPSAMB PMU- Private lessee & Farmers' Organisation
		16	UNA	Rampur	Fruits, Vegetables and Food Grains	Terminal Market Complex	877 MT	HPSAMB PMU- Private lessee & Farmers' Organisation
		<p>Review of the replaced plan is discussed below. It is evaluated that most parts of the plan are problematic in terms of coherence of the project logic and consistency with GPI's policies.</p> <p><u>Different target crops</u></p> <p>Agricultural production plan (Component-2) of the project focuses on vegetable crops including spices, potato, etc. However, half of the planned facilities in the table above are facilities exclusively for fruits crops, whilst other facilities for rice and fish are also included. It is therefore difficult to decipher coherence of the project logic. As vegetable crops and fruits are marketed in the same supply chains in general, there are many common facilities for</p>						

Subjects (page in DPR)	Particulars in DPR	Reviewed Points
		<p>both crops. However, the following ten facilities have no relation with post-harvesting and value addition of vegetable crops.</p> <p>Exclusively for fruits crops (long-term storage and processing): Nos. 1, 2, 3, 4, 6, 10, 11, and 13</p> <p>Exclusively for non-vegetable commodities: Nos. 7 (rice) and 14 (fish)</p> <p><u>Overlapped function of facilities</u></p> <p>Aggregation facilities at <i>mandi</i> site managed by farmers' organisation are planned as shown in Nos. 9, 12, and 15 of the table above. The agricultural production plan (Component-2) also has a plan to develop aggregation facilities (collection centres) at the village level. Both kinds of facilities are expected to perform a quite similar function. Considering GOI's policies to facilitate farmers' free hand in marketing, it is more reasonable to proceed with the plan of collection centres.</p> <p><u>Limited concerns over GOI's policies</u></p> <p>Most of the planned facilities as shown in Nos. 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, and 13 of the table above shall be operated on a commercial basis (long-term storage and processing) considering their target crops and capacities. Whilst GOI's policies do not necessarily deny that <i>mandis</i> operate such kind of commercial facilities, the whole idea of policies does not envisage such a situation that <i>mandis</i> make business in competition with the private sector, even though the operation is outsourced to the private sector.</p>
	11.5 Consulting Services	<p>Allotment of responsibility between the PMU and the JICA TCP to be clarified.</p> <p>Budget on training to be conducted by the TCP should be included in the project.</p> <p>Extension of farmers to be done by the PMU.</p>
12. Time Frame (page 123)	-	Considered the comparison with HPCDP I. In particular, it was re-examined as a schedule that takes into account the effects of access during the rainy season and coronavirus (COVID-19) pandemic.
13. Risk Analysis (page 124)	-	It also describes the risk of implementing ordinance related to APMC reforming and risks of COVID-19 pandemic.
14. Evaluation (page 125)	-	It is a description about project monitoring, and the heading is changed. The organisational set up for monitoring is not mentioned clearly.
15. Success Criteria (page 126)	-	<p>Marketing and organisational strengthening support activities are also included, so these indicators should also be included.</p> <p>It is difficult to understand as an indicator if there is no planted area or expected crop by season.</p>
16. Financial and Economic Analysis (page 127)	-	<p>With and without project conditions are not clear.</p> <p>Proposed crop and estimated crop budget should be cleared.</p> <p>Breakdown of EIRR should be written.</p>
17. Sustainability (pages 130-140)	-	Since it specialises in O&M of irrigation facilities, it is necessary to include strengthening agricultural extension activities that contribute to sustainable income growth, continuous support of FPO, operation of a platform for private partnership, and so on.

Source: JICA Survey Team

Chapter 5 Proposed Subprojects and Result of Sample Survey

5.1 Characteristics and Distribution of Subprojects

5.1.1 Selection Criteria

The 296 minor irrigation scheme called as subprojects were selected by the Department of Agriculture (DOA) as a project target based on criteria such as existence of perennial water source, farmers' strong needs for crop diversification, scale of irrigable area (more than 5 ha), no land acquisition and farmer's willingness for O&M of irrigation facilities. Selection process had started since 2018 and all of the 296 subprojects were inspected by DOA during the preparation of the Detailed Project Report (hereinafter DPR).

5.1.2 Type of Irrigation Facilities

There are two types of schemes in the 296 subprojects, namely; "New" and "Improvement". The new scheme is the new development of the irrigation facilities for existing farmland. The improvement scheme aims to upgrade traditional irrigation systems to augment intake or storage volume, improve irrigation efficiency and/or mitigate the drainage problem.

The proposed subprojects can be also classified by the type of water intake such as Flow Irrigation Scheme (FIS), Lift Irrigation Scheme (LIS), and Shallow Tube Well (STW). The characteristics of each scheme are as follows:

- FIS : Intake surface water and irrigation with gravity
- LIS : Intake surface water by electric pump to lift the water up, then irrigation with gravity system
- STW : Intake ground water with tube well, then irrigation with gravity system. Water table does not exceed 50 meters in depth.

The following tables show the classification of the 296 subprojects by type, by district, and by agroecological zone.

Table 5.1.1 Classification of Subprojects by Each District by Type

Sr. No.	District	Number of Subproject	New			Improvement		CCA (ha)
			FIS	LIS	STW	FIS	LIS	
1	Hamirpur	23	-	21	1	-	1	307.40
2	Una	19	-	9	10	-	-	243.00
3	Bilaspur	19	-	17	-	-	2	293.00
4	Mandi	54	25	15	-	14	-	1,381.00
5	Kangra	60	12	15	-	33	-	2,289.00
6	Kullu	26	3	2	-	21	-	643.00
7	Kinnaur	3	-	-	-	3	-	19.50
8	Shimla	24	12	-	-	12	-	476.00
9	Chamba	16	12	-	-	4	-	296.00
10	Sirmour	9	6	3	-	-	-	272.35
11	Solan	22	8	7	-	7	-	579.16
12	Lahaul and Spiti	21	1	-	-	20	-	634.00
	Total	296	79	89	11	114	3	7,433.41

Source: JICA Survey Team

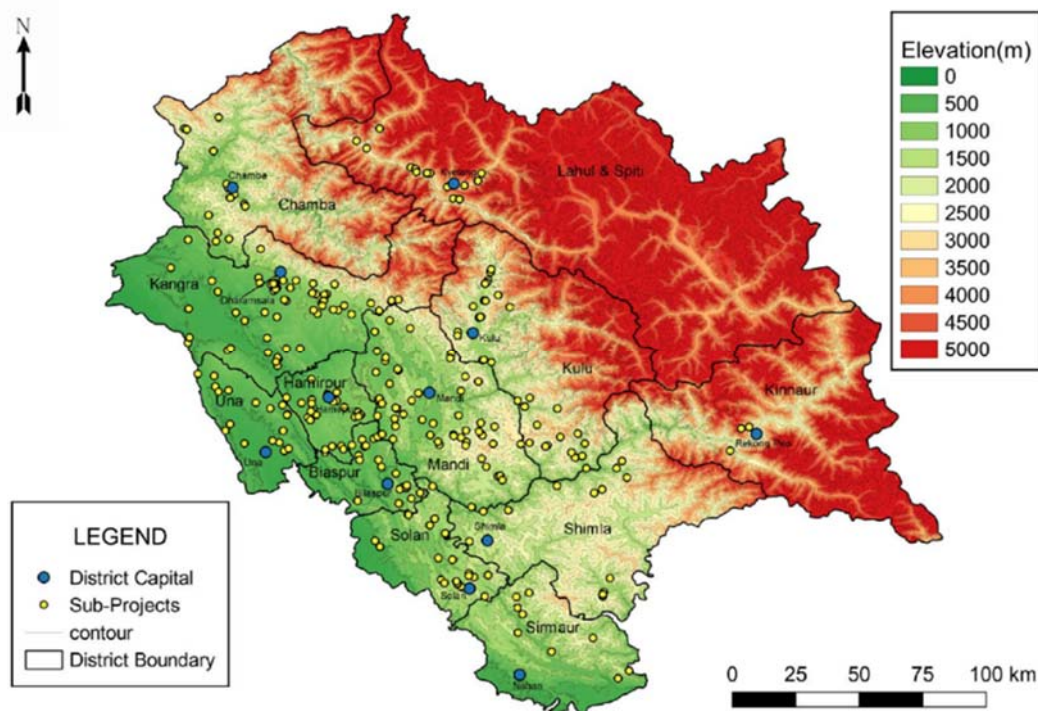
Table 5.1.2 Number of Irrigation Schemes in Agroecological Zone

	Characteristics		New			Improvement		Total	%
	Elevation (m)	Rainfall (mm)	FIS	LIS	STW	FIS	LIS		
Zone 1	240-1000	-	19	75	11	24	3	132	45%
Zone 2	1001-1500	-	23	11		37		71	24%
Zone 3	1501-3250	> 700	37	3		43		83	28%

	(EL.2501 m– 3250 m)							
Zone 4	2501- < 700	19	75		10		10	3%
	3251- Dry/snow							
Total	-	79	89	11	114	3	296	100%
%	-	27%	30%	4%	39%	1%	100%	

Source: JICA Survey Team

The location of the 296 subprojects is shown in Figure 5.1.1.



Source: JICA Survey Team

Figure 5.1.1 Location of 296 Subprojects

5.1.3 Basic Features in Agricultural Components

Basic data on agricultural components of 296 sub-projects are shown in Attachment-5.1.1 and summarized as follows:

Table 5.1.3 Zone-wise Basic Agricultural Features in the Project Area

Agro-ecological Zone	No. of FHHs	Vege. Farmers	Comm. Farmers	Farmers			CCA	Ave. Holding Size	Rabi Season (ha)			Kharif Season (ha)		
				Adv.	Inter.	Cons.			Short Season Crop	Fruit Trees	Fallow	Short Season Crop	Fruit Trees	Fallow
Zone-1	11,115	1,500	234	411	7,488	3,216	3,139	0.3	3,065	1	75	3,061	2	78
Zone-2	5,811	2,693	462	550	3,722	1,539	1,735	0.3	1,693	65	43	1,717	65	19
Zone-3	6,311	3,400	733	576	4,151	1,584	1,879	0.3	1,791	204	89	1,805	204	75
Zone-4	687	407	228	166	431	90	681	1.0	117	12	2	676	12	5
Total	23,924	8,000	1,657	1,703	15,792	6,429	7,433	0.3	6,664	282	209	7,258	283	177

Note: Vege. Farmers: Farmers who cultivate vegetables and sell vegetables

Comm. Farmers: Out of vege. farmers, farmers who sell them proactively

Remarks: Farmers Categories: Adv.=Advanced, Inter. = Intermediate, Cons. = Conservative

Source: JICA Study Team

As shown in the above table, the following points are pointed out.

- i) Major farmers don't cultivate vegetables in commercial basis.
- ii) Average holding size of farmers in CCA is around 0.3 ha. Meanwhile, farmers have some farms outside CCA.
- iii) There are no orchards in CCA. However some farmers in Kullu, Shimla, Kinnaur, and Solan Districts have some orchards outside CCA area.

5.2 Preliminary Assessment of Water Resources

5.2.1 Surface Water

Of the 296 subprojects, DOA has collected observation discharge data for 284 subprojects which water source is surface water (One subprojects in Kinnaur district was planned to intake water from a canal at the time of DPR preparation, but it was planned to intake water from natural river finally. Since the discharge have not been observed, it must be verified that is sufficient for irrigation.). The discharge of each subproject and observation period is shown in Table 5.2.1. Since the rainy season had begun when the preparatory survey started in August, the information provided by DOA was important as it describes the water resource condition at the site. For measuring the discharge, the bucket with stopwatch and area velocity method was used.



Table 5.2.1 Observation Period by DOA



No.	District	Observation Period	Reported Discharge (lps)
1	Hamirpur	March and June 2020	2 - 200
2	Una	March and June 2020	0.5 - 10
3	Bilaspur	March and June 2020	0.5 - 20
4	Mandi	March and June 2020	3 - 200
5	Kangra	March and June 2020	4 - 5,000
6	Kullu	March and June 2020	15 - 70
7	Kinnaur	June 2020	5 - 6
8	Shimla	March and June 2020	2 - 30
9	Chamba	March and June 2020	4 - 200
10	Sirmour	June 2020	6 - 15
11	Solan	March and June 2020	5 - 20
12	Lahaul and Spiti	June 2020	15 - 90

Source: JICA Survey Team

The photos which were taken at the time of site inspection by DOA are shown in Table 5.2.2.

Table 5.2.2 Photos of Discharge Observation

	
Water Resource: Gawald Khad (10 lps) Subproject: LIS Samella, No.14 in Hamirpur District Day the photo was taken: March 2020	Water Resource: Rohal Khad (15 lps) Subproject: LIS Chanjoli, No.13 in Bilaspur District Day the photo was taken: March 2020

	
Water Resource: Sadoli Nallah (15 lps) Subproject: FIS Sadoli to Siyarla, No.9 in Shimla District Day the photo was taken: March 2020	Water Resource: Sua Nallah (50lps) Subproject: FIS Dharmeran, No.15 in Chamba District Day the photo was taken: June 2020

Source: DOA

In the preliminary assessment of the water resources, survey team evaluated from two points namely verification of observation discharged data and sufficiency of observation discharge data for sub-project demand.

Regarding the verification of the observation data, since the coordinates of the intake point are obtained, the validity was verified after measuring the catchment area over the intake point with GIS and calculating the specific discharge based on observed discharge data and catchment area.

On the other hand, regarding sufficiency of the observed data, survey team assumed a typical cropping plan based on DPR and assumed water demand in the observation month. Then using estimated demand and observation discharge data, water adequacy is assessed.

The water balance assessment was carried out with following conditions.

Method: Blaney Criddle Method (commonly used in DOA)

Meteorological data (sunshine hours / temperature): KVK at Kangra

Rainfall data: Monthly data for 2015-2019 in 10 KVKs in HP (effective rainfall were calculated by the same way as their usual one which are used in DPR)

Planting : Kharif (75% Maize, 25% Mixed vegetable)

: Rabi (75% Wheat, 25% Mixed vegetable)

Evaluation result

Regarding the following subprojects, there is a possibility that the observation data is incorrect, over- or under-measured, and fresh measurement is required when BPMU in HPCDP II prepare DPR of each subprojects.

Below subprojects are considered that the discharges are extraordinarily high compare to the other subprojects. So, the discharges of those subprojects have to be verified that it is collect.

Table 5.2.3 List of Subprojects Categorised based on Excessive Specific Discharge

No.	District	Sr.No. in each District	Name of Subproject
1	Hamirpur	12	LIS Chak Kathal
2	Mandi	14	FIS Juddi Ropa Mahidhar
3	Mandi	38	LIS Malhua Jol
4	Mandi	40	LIS Sayoh Balh
5	Kangra	16	FIS Brehu Kuhal
6	Kangra	30	FIS Rainta
7	Kangra	31	FIS Adhwani
8	Kangra	35	FIS Bhedi Kuhal
9	Kangra	39	FIS Lakhnehar Khabbal
10	Kangra	43	FIS Grayen Di Kuhal
11	Kullu	23	FIS Chinsh Ropa
12	Solan	18	FIS Kailar
13	Lahaul&Spiti	7	FIS Kardang

14	Lahaul&Spiti	13	FIS Madgran
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Source: JICA Survey Team

Below subprojects are considered that the discharges are relatively low compare to other sub-projects and they are less than 0.001m³/s/km². So, the discharges of those subprojects have to be verified that it is collect and whether the KVA can get sufficient water.

Table 5.2.4 List of Subprojects Categorised based on Low Specific Discharge

No.	District	Sr.No. in each District	Name of Subproject
1	Hamirpur	13	LIS Jhanjyani
2	Una	7	LIS Sohari Baduha No. 2
3	Bilaspur	13	LIS Chanjoli
4	Mandi	1	FIS Lohara
5	Mandi	2	FIS Rati Malther
6	Mandi	6	FIS Khunag to Saroh
7	Mandi	19	FIS Masog Nalag
8	Mandi	20	FIS Girjhanu Khad to Kao Chalaru
9	Mandi	31	LIS Kotlu
10	Mandi	48	LIS Mandir Tanda (Chowki)
11	Mandi	52	LIS Hajara Khad to Kao
12	Kangra	48	LIS Balu Galoa
13	Kangra	57	FIS Sandh Kuhal
14	Kullu	8	FIS Tharas
15	Kullu	9	FIS Falatnala
16	Shimla	11	FIS Kepu
17	Shimla	12	FIS Shakrori
18	Shimla	15	FIS Ajeetpur
19	Shimla	18	FIS Bharanu to Nalli
20	Solan	4	FIS Beral
21	Lahaul&Spiti	2	FIS Dara Nallah (Jasrath)

Source: JICA Survey Team

On the other hand, the following sub-projects are evaluated as insufficient for water resources because the observed discharge is less than required amount of water for irrigation. It is necessary to consider carefully for crop planning or replace by the other sub project.

Table 5.2.5 List of Insufficient Discharge for Sub Project Demand

No.	District	Sr.No. in each District	Name of Subproject
1	Una	12	LIS Lamlehri (Majra Badla)
2	Una	18	WHS Cum LIS Gurudwara Blah Khalsa
3	Una	19	LIS Sakoun
4	Bilaspur	15	LIS Kotlu Brahmna
5	Mandi	6	FIS Khunag to Saroh
6	Mandi	7	FIS Auhun
7	Mandi	19	FIS Masog Nalag
8	Mandi	26	WHS cum LIS Nawahi
9	Mandi	28	LIS Jol to Mudhai Ransed
10	Mandi	42	LIS Beri Pantheda
11	Kangra	7	FIS Kand Kosri(HDPE Pipe)
12	Kangra	24	LIS Takipur Khas
13	Shimla	2	FIS Karmad to Guhanda
14	Shimla	12	FIS Shakrori
15	Shimla	13	FIS Gharyana
16	Chamba	1	FIS Gohanana
17	Sirmour	5	LIS Tai Tisri Khad
18	Sirmour	6	LIS Bhoal to Tikkri
19	Sirmour	9	FIS Dhayan Khala to Thontha, Naya, Kafenu, Panjod, Kukdech, Bheev
20	Solan	16	FIS Dhayari- Dhalli- Jadari
21	Lahaul&Spiti	2	FIS Dara Nallah (Jasrath)
22	Lahaul&Spiti	18	FIS Khangsar

Source: JICA Survey Team

5.2.2 Groundwater

One subproject out of 23 subprojects in Hamirpur District and ten subprojects out of 19 subprojects in Una District are tube well scheme as shown in Table 5.1.1. On the other hand, there is no tube well schemes in the remaining ten districts. As mentioned in Chapter 2, district wise groundwater reports could be found on the website of Central Ground Water Board. However, subproject wise specific information were not mentioned in the reports and thus a detailed survey, which is called resistivity survey of ground water, must be conducted and approval from the authority before implementation must be secured. At the time of the resistivity survey, ground water level, geological layer, and capacity of recovery on ground water level, etc., will be checked by the Project Management Unit (PMU).

Table 5.2.6 Subprojects in Hamirpur and Una District

No.	District	Sr. No. in the District	Name of Subproject Scheme	Valley
1	Hamirpur	8	STW Siuni	No valley of GWA
2	Una	1	TW Babehar	Una
3	Una	2	TW Labana Majra (Nagnoli)	Una
4	Una	3	TW Pathak Mohalla	Una
5	Una	4	STW Nakdoh (Ramnagar)	Una
6	Una	6	STW Lower Bhanjal	Una
7	Una	9	STW Loharli	Una
8	Una	10	STW Behdala	Una
9	Una	11	STW Chattara	Una
10	Una	13	STW Samoor Kalan	Una
11	Una	15	STW Fatehpur Bhadarkali Ward No.-2	Una

Source: JICA Survey Team

5.3 Result of Sample Survey

5.3.1 Selection of Sample Survey Site

The sample survey area was selected in consideration of balance and accesibility based on the following selection policy so that the overall tendency can be grasped.

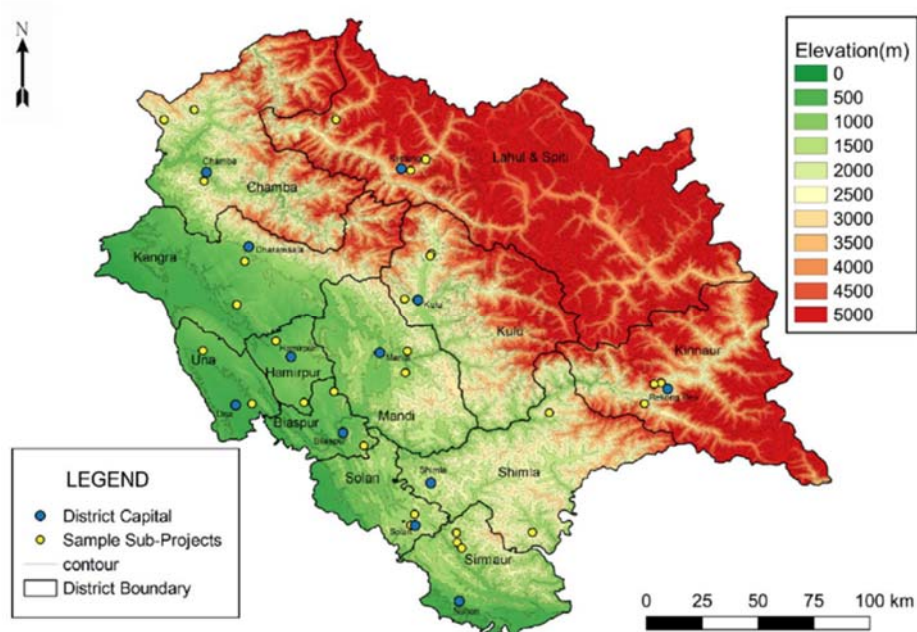
- i) Select to cover all district.
- ii) Select to cover all irrigation types (FIS / LIS / TW, New /Improvement).
- iii) Select to include all agroecological zones (Zone 1 to Zone 4) and select sites that belong to the main agroecology zone in each district as much as possible.
- iv) Select three sub projects per district in the 7 districts (Kullu, Kinnor, Shimla, Chamber, Sirmour, Solan, Lahaul & Spiti) newly added from the HPCDP I to obtain more information and 2 sub projects are selected per district for five districts (Kuru, Kinor, Shimura, Lahore Spiti).
- iv) Select areas that are accessible during the period of the sample survey (in August: rainy season).

Table 5.3.1 Number of Subprojects for Sample Survey

Sr. No.	District	Numbers of Subproject	New			Improvement		Agroecological zone of selected sites	Remarks
			FIS	LIS	STW	FIS	LIS		
1	Hamirpur	2		2				Target of HPCDP I project	
2	Una	2		1	1				
3	Bilaspur	2		1			1		
4	Mandi	2	1			1			
5	Kangra	2		1		1			
6	Kullu	3	1			2		Newly added in HPCDP II project	
7	Kinnaur	3				3			
8	Shimla	2* ¹	1			1			
9	Chamba	3				3			
10	Sirmour	3	1	2					
11	Solan	3				3			
12	Lahaul and Spiti	3	1			2			
Total as Sample Survey		30	5	7	1	16	1		
Total Out of All (296) Sites		/296	/79	/89	/11	/114	/3		

Note: When the JICA Survey Team planned the survey schedule, one site in Shimla District was difficult to be visited because of the location, the number of sample survey becomes two.

Source: JICA Study Team



Source: JICA Survey Team

Figure 5.3.1 Sample Survey Site

5.3.2 Methodology

The main points to be clarified on infrastructure development are the eligibility of proposed components and the availability of water source. The JICA Survey Team conducted the interview survey to farmers and site inspection in each subproject by enumerators. The methodology of confirmation on each component is shown as follows:

Table 5.3.2 Methodology of Confirmation of Infrastructure Development

Components	Farmers Interview	Site Inspection	Points to be Confirmed
1) Minor Irrigation	✓	✓	The type of minor irrigation whether FIS, LIS, and STW depends on the site condition, especially availability of surface water and location (elevation) of available water source. These were confirmed through interview survey and site inspection. Eligibility of proposed infrastructure which is tabulated in Table 5.3.3 is also confirmed in this survey.
2) Micro Irrigation	✓	✓	Micro irrigation system (MIS), sprinkler irrigation system and drip tube irrigation system are planned to be installed to the subprojects in the Project. However, the specific subprojects and the type of micro irrigation system to be installed are not yet decided at this moment. In the sample survey, the JICA Survey Team confirmed the farmer's motivation to use MIS and existing field
3) Catchment Area Treatment	✓	✓	When a subproject take water from a river, it is a concern that water intake will be covered with silt which floats out from the catchment area. To sustain the function of water intake and to reduce the risk, the catchment area treatment is planned in the Project. The JICA Survey Team inspected the site condition around the expected water intake.
4) Solar Pump	✓	-	Solar pump is expected to be installed at the subprojects that are LIS or STW because it will be used for the main motor pump. In addition, since solar panel system is not sufficient to operate a motor pump throughout all the required time, the provision for the supply of power has been made in those subprojects. The JICA Survey Team conducted interview survey to know the current situation and their expectation.
5) Farm Access Road	✓	✓	If existing farm access roads are not covered with concrete or asphalt, when there are heavy rains, transport efficiency is reduced and sometimes the roads are closed because of collapse. The JICA Survey Team conducted interview survey and site inspection.
6) Solar Fencing	✓	✓	Crops are damaged by wild animals and monkeys all over the Himachal Pradesh state and the DOA is undertaking the scheme to develop solar fencing. In the Project, the installation of solar fencing in the subprojects is expected. The JICA Survey Team conducted interview survey to the farmers.

Source: JICA Survey Team

5.3.3 Infrastructure Development Needs

The result of the sample survey for infrastructure development is summarised in this section. The photos at the sample site are shown in Attachment-5.3.1.

Table 5.3.3 summarises the contents of the irrigation facilities amongst the infrastructure development components proposed in the DPR for the 30 subprojects selected for the sample survey. For the components of “catchment area treatment” and “solar fencing”, there is no individual estimation for each subproject and is instead estimated for the entire project.

Table 5.3.3 Proposed Facilities and Structures at the Sample Subprojects

Sr. No.	District (Block)	Sr. No. in Dist.	Name and Type of Scheme	New/Improvement	Solar Pump (Y/N)	Road (km)	Proposed Structure
1	Hamirpur	20	LIS Balduhak	New	Y	-	Percolation Well: 1 No., Pump House: 1 No., Protection Work/Spur: 1.5 Rmt., Pumping Machinery: 1 No., Rising Main: 700 mtr., Main Delivery Tank: 1 No., Distribution System: HDPE Pipeline: 3500 mtr., Outlet Chamber: 60 Nos., Storage Tank: 3 Nos., Retaining Wall: 3 Nos., Sluice Valve Chamber: 10 Nos., SOP.
2	Hamirpur	14	LIS Samella	New	Y	-	Dyke: 1 No., Sump Well: 1 No., Pump House: 1 No., Protection Work/Spur: 2 Nos., Pumping Machinery: 1 No., Rising Main: 600 mtr., Main Delivery Tank: 1 No., Distribution System: HDPE Pipeline: 4000 mtr., Outlet Chamber: 40 Nos., Storage Tank: 1 No., Retaining Wall: 1 No., Sluice Valve Chamber: 10 Nos., SOP.
3	Una	11	STW Chattara	New	Y	-	Tube Well: 1 No., Pump House: 1 No., Pumping Machinery: 1 No., Rising Main: 400 mtr., Main Delivery Tank: 1 No., Distribution System: HDPE Pipeline: 3000 mtr., Retaining Wall: 4 Nos., Outlet Chamber: 30 Nos., SOP.
4	Una	14	LIS Mandholi	New	Y	-	WHS/Intake Chamber: 1 No., Pump House: 1 No., Pumping Machinery: 1 No., Rising Main: 600 mtr., Main Delivery Tank: 1 No., Distribution System: HDPE Pipeline: 4500 mtr., Outlet Chamber: 50 Nos., Retaining Wall: 3 Nos., SOP.
5	Bilaspur	18	LIS Dharbyain	New	Y	0.80	Water Harvesting Structure: 1 No., Intake Chamber: 1 No., Pump House: 1 No., Sump Well: 1 No., Fencing: 60 mtr., Protection Work/Spur: 2 Nos., Pumping Machinery: 2 sets, Rising Main: 550 mtr., Main Delivery Tank: 1 No., Nallah Crossing: --, Distribution System: HDPE Pipeline: 2500 mtr., Outlet Chamber: 40 Nos., Storage Tank: 1 No., Retaining Wall: 2 Nos., SOP.
6	Bilaspur	7	LIS Chanjota	Improvement	Y	0.15	Percolation Well: 1 No., Pump House: 1 No., Protection Work/Spur: 2 Nos., Pumping Machinery: 1 set of 15 HP, Rising Main: 500 mtr., Main Delivery Tank: 1 No., Nallah Crossing/Road Crossing: 2 Nos., Distribution System: HDPE Pipeline: 2500 mtr., Outlet Chamber: 20 Nos., Storage Tank: 3 Nos., Retaining Wall: 2 Nos., SOP.
7	Mandi	4	FIS Kasan to Sanj	Improvement	N	-	Main Channel/HDPE Main Pipeline: 3200 Rmt, HDPE Pipe/Distribution: 1800 Rmt, Water Opening Gate: 5 Nos., Diversion Wier: 1 No., Intake Chamber: 1 No., Outlet Chamber: 64 Nos., Dropping Structure: 4 Nos., Retaining Wall: 7 Nos.
8	Mandi	13	FIS Suma to Shivabadar	New	N	-	Main Channel: 3000, HDPE Pipe/Distribution: 2000 Rmt, Storage Tank: 3 Nos., Diversion Wier: 1 No., Outlet Chamber: 30 Nos., Dropping Structure: 4 Nos., Retaining Wall: 4 Nos.
9	Kangra	37	FIS ManuniKuhai	Improvement	N	2.00	Main Channel :2.0 Km; Pucca Field Channel:0.2 Km.; Diversion Weir: 1 No.; Retaining Wall:05 Nos. (2 mtr, 3 mtr, 4 mtr, 5 mtr and 6 mtr)
10	Kangra	48	LIS BaluGaloa	New	Y	-	WHS: 1 No., Pump House: 1 No., Protection Work: 20 No., Pumping Machinery: 2 Nos., Rising Main: 800 Rmt., Main Delivery Tank: 1 No., HDPE Pipe: 4700 Rmt., Outlet Chamber: 47 Nos., Nallah Crossing: 2 Nos., Retaining Wall: 4 Nos., Storage Tank: 2 Nos., Sump Well: 1 No., Fencing: 50 Rmt.,Supply of Power
11	Kullu	4	FIS Bran Bihal Seri	Improvement	N	-	Main Channel: 800 Rmt., Pucca Field Channel: 1200 Rmt., HDPE Pipe: 500 Rmt., Water Opening Gates: 12 Nos., Diversion Weir: 1 No., Intake Chamber: 10 Nos., Dropping Structure: 2 Nos., Retaining Wall: 4 Nos.
12	Kullu	7	FIS Dobha Seri	Improvement	N	-	Main Channel: 700 Rmt., Pucca Field Channel: 1800 Rmt., HDPE Pipe: 300 Rmt., Water Opening Gates: 6 Nos., Diversion Weir: 1 No., Intake Chamber: 8 Nos., Dropping Structure: 2 Nos., Retaining Wall: 3 No.
13	Kullu	22	FIS Bhuthi	New	N	-	Main Channel: 2500 Rmt, Pucca Field Channel: 1200 Rmt., HDPE Pipe: 3700 Rmt., Water Opening Gate: 12 Nos., Diversion Weir: 2 No., Intake Chamber: 2 Nos., Outlet Chamber: 15 Nos., Retaining Wall: 8 Nos., Storage Tank: 2 Nos.,
14	Kinnaur	1	FIS Japroden (Khawangi Kanda)	Improvement	N	-	HDPE Pipe: 5000 Rmt., Intake Chamber: 1 No., Dropping Structure: 1 No.
15	Kinnaur	2	FIS NichlaBhaturi	Improvement	N	-	Pucca Field Channel: 600 Rmt.

Sr. No.	District (Block)	Sr. No. in Dist.	Name and Type of Scheme	New/Improvement	Solar Pump (Y/N)	Road (km)	Proposed Structure
16	Kinnaur	3	FIS Rogfa to Kothi Kanda	Improvement	N	-	HDPE Pipe: 6000 Rmt, Water Opening Gate: 1 No., Intake Chamber: 1 No., Outlet Chamber: 10 Nos.
17	Shimla	7	FIS Deothi Nallah to Keem	New	N	-	Main Channel:4500 Rmt, Pucca Field Channel:2300 Rmt, Pattra Cutting: 4500 Rmt, HDPE Pipe: 1500 Rmt, Water Opening Gate:175 Nos., Storage Tank :1No, Diversion Weir:1 No, Intake Chamber: 1 No, Outlet Chamber:38 Nos., Dropping Structure :285 Nos., Retaining Wall:275 Rmt, Water Measuring Device:1 No.
18	Shimla	16	FIS Jhaldi to Gadda Gram	Improvement	N	-	Main Channel: 3000 Rmt, Pucca Field Channel: 4000 Rmt., Storage Tank: 2 Nos., Intake Chamber: 1 No, Outlet Chamber: 15 Nos., Retaining Wall: 7 Nos.
19	Chamba	3	FIS Kolka	Improvement	N	-	Main Channel: 700 Rmt., Pucca Field Channel: 500 Rmt., HDPE Pipe: 15 Rmt., Water Opening Gates: 1 No., Storage Tank: 1 No., Intake Chamber: 1 No., Outlet Chamber: 2 Nos., Diversion Weir: 1 No.
20	Chamba	12	FIS Bhadsar	Improvement	N	-	Main Channel: 1600 Rmt., Pucca Field Channel: 800 Rmt., Storage Tank:3 Nos., Diversion Weir: 1 No., Intake Chamber: 1 No., Outlet Chamber: 6 Nos., Retaining wall: 2 Nos.
21	Chamba	15	FIS Dharmeran	Improvement	N	-	Diversion Weir: 1 No., Intake Chamber: 1 No., Outlet Chamber: 20 Nos., Retaining Wall: 40 Nos., HDPE Pipe: 2600 Rmt., Storage Tank: 3 Nos.
22	Sirmour	2	FIS PandharaChoken	New	N	-	HDPE Pipe: 3000 Rmt., Storage Tank: 2 Nos., Diversion Weir: 1 No., Intake Chamber: 1 No., Outlet Chamber: 3 Nos., Retaining Wall: 4 Nos.
23	Sirmour	4	LIS Chod Ka Malavan	New	Y	-	Intake Chamber: 1 No., Percolation Well: 1 No., Pump House: 1 No., Protection Work: 1 No., Pumping Machinery: 1 No., Rising Main: 2500 mtr., Nallah Crossing/Road Crossing: 2 Nos., Main Delivery Tank: 1 No., Distribution System: HDPE Pipeline: 2000 mtr., Outlet Chamber: 5 Nos., Storage Tank: 3 Nos., Retaining Wall: 4 Nos., SOP.
24	Sirmour	6	LIS Bhoal to Tikkri	New	Y	-	Intake Chamber: 1 No., Percolation Well: 1 No., Pump House: 1 No., Protection Work: 2 Nos., Pumping Machinery: 1 No., Rising Main: 1100 mtr., Nallah Crossing/Road Crossing: 2 Nos., Main Delivery Tank: 1 No., Distribution System: HDPE Pipeline: 2000 mtr., Outlet Chamber: 5 Nos., Storage Tank: 2 Nos., Retaining Wall: 4 Nos., SOP.
25	Solan	16	FIS Dhayari - Dhalli- Jadari	Improvement	N	-	Main Channel: 6000 Rmt., Pucca Field Channel: 1500 Rmt., GI/RCC Pipe: 30 Rmt., Outlet Chamber: 12 Nos., Intake Chamber: 12 Nos.
26	Solan	18	FIS Kailar	Improvement	N	-	Main Channel: 1000 Rmt.
27	Solan	22	FIS Chakli (Shawad to Dadla)	Improvement.	N	1.00	Main Channel: 500 Rmt.
28	Lahaul and Spiti	1	FIS Panahi	New	N	-	Main Channel: 700 Rmt., Pucca Field Channel: 150 Rmt., HDPE Pipe: 1800 Rmt., GI/RCC Pipe: 15 Rmt., Water Opening Gate: 20 Nos., Storage Tank: 1 No., Diversion Weir: 1 No., Intake Chamber: 3 Nos., Outlet Chamber: 11 Nos., Retaining Wall: 2 Nos.
29	Lahaul and Spiti	14	FIS Mayur Kuhl Gemoor	Improvement	N	-	Main Channel: 2000 Rmt., HDPE Pipe: 2500 Rmt., Water Opening Gate: 3, Diversion Weir: 1 No., Intake Chamber: 1 No., Outlet Chamber: 10 Nos., Dropping Structure: 5 Nos., Retaining Wall: 1 No.
30	Lahaul and Spiti	16	FIS Peukar	Improvement	N	-	Main Channel: 2500 Rmt., Pucca Field Channel: 1200 Rmt., HDPE Pipe: 3700 Rmt., Water Opening Gate: 2, Diversion Weir: 1 No., Intake Chamber: 2 Nos., Outlet Chamber: 15 Nos., Retaining Wall: 9 Nos.





Source: JICA Survey Team

(1) Minor Irrigation

In the sample survey, the water sources at the intake points of 29 subprojects to be irrigated using surface water were investigated, and the amount of water, as of August 2020, was visually confirmed by enumerators at the site and by the Japanese experts through photo image. Although it is difficult to compare between two flow discharges observed in the different month, the observed flow rate at this time was more than the discharge stated in the DPR by DOA. According to interviews with farmers who accompanied the survey, all 29 water sources had year-round flow and were suitable as irrigation water sources.

Of the 30-sample subprojects, 17 are targets for rehabilitation and improvement of existing facilities, all of which are FIS. According to the survey, no cross-sectional structures on the river are found in the existing intake facilities, and a natural intake method called *Nallah* is adopted. According to farmers, it is difficult to take water during the dry season when the river water level drops, and during the rainy season when the river water level rises, the inflow of surplus water is a problem. After the water intake, irrigation water is conveyed to farmlands by canal. The canal is an earthen canal called *kutchha kuhls* or one made of wood. Since the canal passes through the foot of the slope, it is often divided by landslides during the rainy season. Water leakage from the canal was also observed. According to farmers, canals are cleaned and formed every year before irrigation, however, earthen and timber canals take time and effort to do so. Therefore, there was a request to replace the current canals with concrete canals and high-density polyethylene (HPDE) pipes. In most cases, the canals are used by multiple farmers, but there is no suitable diversion facility, the canals are destroyed, and water is taken to individual farmland as needed.

Table 5.3.4 Photo of Sample Survey (Minor Irrigation: FIS)

	
<p>Existing kutchha channel (earthen channel), FIS Peukar (Improvement), Lahaul and Spiti</p>	<p>Existing wooden channel, FIS Jhaldi to Gadda (Improvement), Shimla</p>
	
<p>Existing CCA with rain-fed cultivation, FIS Suma to Shivabadar (New), Mandi</p>	<p>Existing CCA with natural stream, FIS Panahi (New), Lahaul and Spiti</p>

	
Expected water source, namely: Summa Khad, FIS Suma to Shivabadar (New), Mandi	Expected Water Source, namely: Chenas Nallh FIS Panahi (New), Lahaul and Spiti

Source: JICA Survey Team

The LIS and STW subprojects are planned to build new irrigation facilities. The pump head is generally moderate and no excessive planning was observed. In the new construction area, it was confirmed that farmers cultivate cereal and vegetable under rainfed or irrigate by taking water from a distant stream with a small-diameter rubber pipe. According to interviews with farmers, there was a high need for irrigation with water intake by pumps, and there was also a high motivation of farmers on utilising those facilities after construction with proper operation and maintenance (O&M).

In the STW scheme in Una District, which was included as a sample area, similar irrigation was seen in the surrounding farmland. According to an interview with a farmer, so far, the groundwater level has not decreased over time in similar shallow tube wells in the surrounding area, and although there are seasonal fluctuations, stable irrigation water intake is possible.

Table 5.3.5 Photo of Sample Survey (Minor Irrigation: LIS and STW)


	
Existing cultivated field (Maize, tomato, beans, peach orchard etc.), LIS Chod Ka Malawan (New), Sirmour	Existing cultivated field: Maize crop, STW Chattara (New), Una
	
Expected water source, LIS Chod Ka Malawan (New), Sirmour	Existing stream near expected tubewell, STW Chattara (New), Una

Source: JICA Survey Team

(2) Micro Irrigation

DPR plans to procure micro-irrigation kits such as sprinklers and drip irrigation. A sample survey was conducted in the 30 subprojects and only few farmers were using these micro-irrigations. These farmers used sprinkler irrigation facilities to grow cauliflower and tomatoes. According to the farmer interview surveys, the demand for the introduction of micro-irrigation facilities is high. There was a request to reduce the running cost of the irrigation facility by saving water.

Table 5.3.6 Photo of Sample Survey (Micro Irrigation)



	
Existing cultivated field (Cauliflower), FIS Kailar to Bajdol (Improvement), Solan	Existing cultivated field (Potato) with sprinkler, FIS Peukar (Improvement), Lahaul and Spiti

Source: JICA Survey Team

(3) Catchment Area Treatment

In the sample survey, the flow condition at the intake point and the vegetation in the upstream area were confirmed by the enumerators. Basically, most of the mountains and foothills in the upper reaches are covered with trees. These have the function of suppressing the generation of surface flow during rainfall and preventing surface erosion. However, according to an interview survey with farmers, in recent years, the intensity of rainfall has increased, and deforestation has progressed partially. Thus, there is concern about the impact on sediment runoff due to landslides. Generally, catchment area treatment is required when the water is taken from the river except in the STW scheme in the proposed subproject sites.

Table 5.3.7 Photos of Sample Survey (Catchment Area Treatment)

	
Existing and expected water source, LIS Mandholi (New), Una	Existing water source, namely; SalasiKhad, LIS Balduhak (New), Hamirpur

Source: JICA Survey Team

(4) Farm Access Road

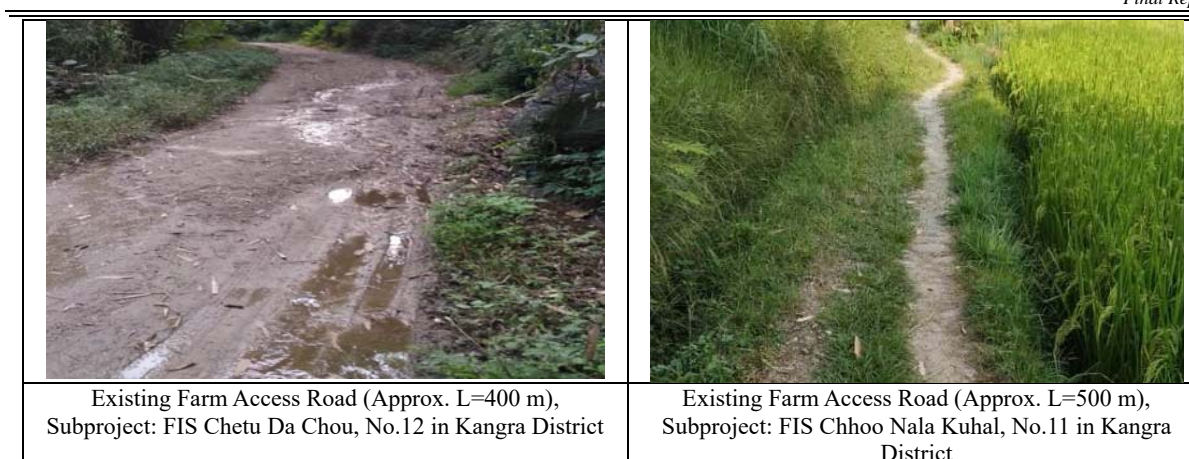
The farm access road listed in the DPR is the connecting road from the village to the farmland or the intake point. After the rehabilitation/upgrading of the road, it is expected that the accessibility to farmland will improve and the time spent on agriculture will shorten. It will be easier to bring in agricultural materials and equipment and bring out the agriculture produce.

The farm access roads are unpaved or gravel pavements approximately 1.5-3.0 m wide, and in August 2020, only a few of the 30-sample subprojects was passable by vehicle. Although some of them have culverts in particular points, the number of culverts and side drains are not enough.

According to the results of the interviews with farmers, the roads are muddy during the rainy season from July to September and only 4WD vehicles can pass through. The maintenance such as pot filling and reforming the roads are required every year at the end of the rainy season. According to farmers, the need for road repairs is extremely high and improving accessibility can contribute to the reduction of production costs and the raising of farm gate price of agriculture produce.

Table 5.3.8 Photos of Sample Survey (Farm Access Road)

	
Existing Farm Access Road (Approx. L=800 m), LIS Dharbyain (Improvement), Bilaspur	Existing Farm Access Road (Approx. L=2000 m), FIS ManuniKuhai, Kangra
	
Existing Farm Access Road (Approx. L=1000 m), Subproject: LIS Baggi (Ponta), No.45 in Mandi District	Existing Farm Access Road (Approx. L=1000 m), Subproject: LIS Dhaneti Garla, No.55 in Kangra District
	
Existing Farm Access Road (Approx. L=300 m), Subproject: LIS Pidhartta, No.16 in Hamirpur District	Existing Farm Access Road (Approx. L=150 m), Subproject: LIS Chanjota, No.7 in Bilaspur District



Source: JICA Survey Team and DoA

(5) Solar Fencing

According to the farmers that belong to agroecological Zones 2 to 4, there is a concern that wildlife may damage crop production. The main wildlife that cause damage are wild boars, mice, monkeys and sparrows. According to the farmers, some farmers hesitate to grow vegetables due to the damage caused by wildlife. It was also confirmed that solar fences are more effective and are in high demand from the viewpoint of running cost and absence of electricity.

5.3.4 Progress of Crop Diversification and Major Challenges

(1) Results in Agriculture Field Obtained from the Sample Survey

(a) Land Holding Size

It is discovered through the sample survey that farmer's lands are spread out in and around the Cultivable Command Area (CCA) in the respective subproject. Land holding size in the sample survey is shown in Attachment-5.3.2 and summarised as follows:

Table 5.3.9 Typical Land Holding Size (ha/FHH) by Agroecological Zones

Agroecological Zones				
Zone-1 (240 m to 1,000 m)	Zone-2 (1,001 m to 1,500 m)	Zone-3 (1,501 m to 3,250 m)	Zone-4 (over 3,250 m)	Average
0.86	0.76	0.92	0.88	0.85

Note: Lands are located in and around CCA.

Source: JICA Survey Team

(b) Cropping Pattern

The agroecological zone-wise and season-wise cropping pattern in the sample survey is shown in Attachment-5.3.3 and summarised as follows:

Table 5.3.10 Typical Cropping Pattern by Agroecological Zones

Agroecological Zones	Rabi Season					Kharif Season					
	Wheat/ Barley	Others	Vegetables	Fruit Trees	Total	Maize	Others	Paddy	Vegetables	Fruit Trees	Total
Zone-1	85	5	8	2	100	71	8	12	7	2	100
Zone-2	21	10	64	5	100	36	4	0	53	7	100
Zone-3	29	16	27	28	100	38	11	2	27	22	100
Zone-4*1	15	7	27	51	100	24	38	0	38	0	100
Zone-4*2	0	0	0	0	0	7	0	0	91	2	100

Note: *1 for Districts Kinnaur and Shimla, *2 for Lahaul and Spiti with no cultivation in the Rabi season due to snowfall

Source: JICA Survey Team

The following tables is prepared based on MPR of PMU, in order to confirm current land use in 30 Sub-projects for sample survey.

Table 5.3.11 Land Use in 30 Sub-projects for Sample Survey

Agro-ecological Zones	No. of FHHs	Vege. Farmers	Com. Farmers	Kharif Season			CCA (ha)	Ave. Holding Size (ha)	Rabi (ha)		Kharif (ha)	
				Adv.	Inter.	Cons.			Short Season Crop	Fallow	Short Season Crop	Fallow
Zone-1	11,115	1,500	234	411	7,488	3,216	3,139	0.3	3,065	75	3,061	78
Zone-2	5,811	2,693	462	550	3,722	1,539	1,735	0.3	1,693	43	1,717	19
Zone-3	6,311	3,400	733	576	4,151	1,584	1,879	0.3	1,791	89	1,805	75
Zone-4	687	407	228	166	431	90	681	1.0	117	2	676	5
Total	23,924	8,000	1,657	1,703	15,792	6,420	7,433	0.3	6,664	209	7,528	177

Note: *1 for Districts Kinnaur and Shimla, *2 for Lahaul and Spiti with no cultivation in the Rabi season due to snowfall
Source: MPR, PMU

As shown in the above table, CCA consists of farmland for short season crops and fallow. Meanwhile, it is intimated there are no orchards in the CCA of 30 sub-projects.

As a result, cropping intensity in the 30 sub-projects is estimated in the following table.

Table 5.3.12 Cropping Intensity in CCA of 30 Sub-projects (%)

Agro-ecological Zones	Rabi Season				Kharif Season				
	Wheat	Others	Vegetables	Total	Maize/Wheat:2	Others	Paddy	Vegetables	Total
Zone-1	85	10	5	100	80	10	5	5	100
Zone-2	40	55	5	100	45	0	55	0	100
Zone-3	60	35	5	100	60	0	35	5	100
Zone-4*1	0	0	0	0	10	0	90	0	100

Note:

*1: for Lahaul and Spiti with no cultivation in the Rabi season due to snowfall.

*2: Maize for Zones 1 to 3, Wheat for Zone-4

Source: JICA Survey Team

Further agroecological zone-wise cultivated crops are shown in the following table.

Further agroecological zone-wise cultivated crops are shown in Table 5.3.13.

Table 5.3.13 Agroecological Zone-wise Major Crops

Category	Cropping Season	Agroecological Zones			
		Zone-1 (240 m to 1,000 m)	Zone-2 (1,001 m to 1,500 m)	Zone-3 (1,501 m to 3,250 m)	Zone-4 (over 3,250 m)
Food Grains	Kharif	Maize Paddy Pulses	Maize Pulses	Maize Pulses Soybeans Finger millet	Maize Pulses Buckwheat
	Rabi	Wheat	Wheat Barley	Wheat Barley Mustard	Wheat Barley Chickpea
Vegetables	Kharif	Okra Brinjal Cucurbits Capsicum Tomato Chili	Potato Capsicum Tomato Cucurbits Chili French beans Ginger Onion Beans Cabbage Cauliflower	Brinjal Tomato Cabbage Cauliflower Cucurbits French beans Pea Chili	Pea Potato Cauliflower Tomato Carrot French beans
	Rabi	Cabbage Potato Radish	Pea Cauliflower Beans	Potato Pea Cauliflower	Pea Potato Cauliflower

		Carrot Cauliflower Garlic Onion Pea	Ginger Broccoli Sarson Red Cabbage	Cabbage Garlic Onion Coriander	Cabbage
Fruit Trees		Mango Litchi Citrus	Plum Pear Peach Mango Pomegranate Litchi Persimmon Apple Walnut	Apple Plum Pear Persimmon Peach Apricot Lemon Lime Walnut	Apple Pear Apricot Walnut
Others	Kharif	Fodder crops Sorghum Bajra	Fodder crops	Amaranthus	
	Rabi	Mustard Fodder crops	Fodder crops		

Source: JICA Survey Team

(c) Economic Status

The agroecological zone-wise and economic status in the sample survey is shown in Attachment-5.3.4 and summarised in Table 5.3.14:

Table 5.3.14 Agroecological Zone-wise Economic Status

(Unit: INR/year)

Category	Agroecological Zones				
	Zone-1	Zone-2	Zone-3	Zone-4	Average
Farm Income	50,000	223,800	166,300	233,400	182,300
Non-farm Income	148,800	92,500	71,900	98,400	123,800
Total	198,800	316,300	238,200	331,800	306,100

Note : Non farm income comes from mainly daily labour, livestock/dairy and small business and trade

Source: JICA Survey Team

(d) Assets

Spread of farm machinery and transportation means are slow, and there is no significant difference amongst respective agroecological zones as shown in Attachment-5.3.5 and summarised in Table 5.3.15:

Table 5.3.15 Spread of Farm Machinery and Transportation Means

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
4-wheel Tractor	few	very few	very few	very few
Power Tiller	few	few	few	few
Knapsack Type Sprayer (engine)	few	few	few	many
Knapsack Type Sprayer (manual)	many	many	many	many
Vehicle	few	few	few	few
Motorcycle	many	few	most	most

Note: very few: a few farmers, few: less than 50%, many: from 50% to 80% of farmers, most: more than 80% of farmers

Source: JICA Survey Team

Users of micro-irrigation system such as sprinkler irrigation as well as drip irrigation are limited in the sample subprojects, whilst processing unit, solar pump, and well irrigation are not so common as shown in Attachment-5.3.5 and summarised in Table 5.3.16.

Table 5.3.16 Spread of Irrigation Facilities and Other facilities

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
Sprinkler Irrigation System	few	very few	few	few
Drip Irrigation System	very few	very few	very few	very few
Processing Unit	very few	very few	few	very few
Solar Pump	very few	very few	few	few
Well Irrigation	very few	very few	few	few

Note: very few: a few farmers, few: less than 50%, many: from 50% to 80% of farmers, most: more than 80% of farmers
Source: JICA Survey Team

Meanwhile, communication gadgets are relatively common as shown in Table 5.3.17:

Table 5.3.17 Spread of Communication Gadgets

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
Smart Phone	many	many	many	many
Mobile Phone	many	many	most	most

Note: very few: a few farmers, few: less than 50%, many: from 50% to 80% of farmers, most: more than 80% of farmers
Source: JICA Survey Team

As shown in the table above, in the sample subprojects, it seems that the mobile phone is more common rather than the smart phone.

Further, livestock raising such as cow and buffalo are common as shown in Table 5.3.18:

Table 5.3.18 Livestock Raising

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
Cow	many	many	many	many
Buffalo	many	few	few	very few
Goat/sheep	few	few	few	few
Poultry	few	very few	few	few

Note: very few: a few farmers, few: less than 50%, many: from 50% to 80% of farmers, most: more than 80% of farmers
Source: JICA Survey Team

(e) Expectation to the Project

It was clarified that most farmers in the sample subprojects are interested in the utilisation of irrigation water for vegetable rather than food grains and fruit trees. Further, they expect the production and quality to improve under the irrigation condition. The response of all participants in each agroecological zone is shown in Attachment-5.3.6 and summarised in Table 5.3.19.

Table 5.3.19 Expectation from the Project

(i) Utilisation of irrigation water (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1. For food grains (wheat / maize / others)	15	6	4	0
2. For vegetables	76	91	57	60
3. For orchard trees	9	3	36	38
4. For livestock	0	0	3	2
Total	100	100	100	100

Source: JICA Survey Team

(ii) Expectation under irrigation condition (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1. Increment of production	65	77	53	53
2. Improvement of quality	26	18	43	37
3. Cultivation of more crops	9	5	4	10
Total	100	100	100	100

Source: JICA Survey Team

(f) Supply of Farm Inputs

Most farmers in the sample subprojects purchase seeds of food grains at sales points of Delhi Development Authority (DDA), whilst some farmers do seed multiplication by themselves. However, majority of respondents prefer to purchase vegetable seeds from private shops. Meanwhile, many farmers prepare vegetable seedlings by themselves. Regarding fertiliser, sales points as well as private shops are common for the majority of farmers in the sample subprojects. The results of the sample survey are shown in Attachment-5.3.7 and summarised in Table 5.3.20.

Table 5.3.20 Supply of Farm Inputs

(i) Seeds of Wheat (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1) University	0	0	0	0
2) Sales point of SMS office ✓	83	72	41	9
3) Private shop ✓	7	16	3	14
4) KVK	0	0	0	0
5) Farmers	2	11	3	17
6) By myself ✓	8	1	53	60
Total	100	100	100	100

Source: JICA Survey Team

(ii) Seeds of Maize (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1) University	0	0	0	0
2) Sales point of SMS office ✓	84	62	24	0
3) Private shop ✓	6	9	23	0
4) KVK	0	0	0	0
5) Farmers	2	5	2	44
6) By myself ✓	8	24	51	56
Total	100	100	100	100

Source: JICA Survey Team

(iii) Seeds of Paddy (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2*1	Zone-3	Zone-4*1
1) University	0	-	0	-
2) Sales point of SMS office ✓	49	-	9	-
3) Private shop ✓	50	-	0	-
4) KVK	0	-	0	-
5) Farmers	0	-	0	-
6) By myself ✓	1	-	91	-
Total	100	-	100	-

Remark: *1 means no respondents cultivate paddy.

Source: JICA Survey Team

(iv) Seeds of Vegetables (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1) University	0	0	0	7
2) Sales point of SMS office ✓	37	12	26	26
3) Private shop ✓	63	88	67	50
4) KVK	0	0	0	0
5) Farmers	0	0	4	8
6) By myself ✓	0	0	3	9
Total	100	100	100	100

Source: JICA Survey Team

(v) Seedlings of Vegetables (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1) University	0	0	0	0
2) Sales point of SMS office ✓	81	11	1	0
3) Private shop ✓	0	15	70	0
4) KVK	0	0	0	0
5) Farmers	5	0	13	42
6) By myself ✓	14	74	16	58
Total	100	100	100	100

Source: JICA Survey Team

(vi) Fertiliser (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1) University	22	0	0	0
2) Sales point of SMS office ✓	78	1	32	18
3) Private shop ✓	0	83	68	82
4) KVK	0	16	0	0
5) Farmers	0	0	0	0
6) By myself ✓	0	0	0	0
Total	100	100	100	100

Source: JICA Survey Team

(g) Constraints in Cultivation of Food Grains

It was clarified that the major constraints are expensive seeds, low yield, and insufficient extension activities, as shown in Attachment-5.3.8, 9, and 10, and summarised in Table 5.3.21.

Table 5.3.21 Constraints in Cultivation of Major Crops

(i) Food Grains (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1. Quality seeds are not available when we need.	21	28	19	22
2. Fertiliser is not available when we need.	25	13	39	17
3. Seeds are expensive.	26	72	100	79
4. Low yield	86	70	93	66
5. No visiting of extension officers	52	50	73	78
6. No training programmes	91	62	96	72

Source: JICA Survey Team

(ii) Vegetables (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1. Quality seeds are not available when we need.	18	11	20	51
2. Fertiliser is not available when we need.	18	1	13	41
3. Seeds are expensive.	96	87	100	100
4. Low yield	99	53	90	81
5. No visiting of extension officers	47	50	64	66
6. No training programmes	100	62	93	58

Source: JICA Survey Team

(iii) Fruit Trees (% out of total response)

Category	Agroecological Zones			
	Zone-1	Zone-2	Zone-3	Zone-4
1. Quality seeds are not available when we need.	11	35	58	30
2. Fertiliser is not available when we need.	11	0	48	28
3. Seeds are expensive.	97	100	82	87
4. Low yield	93	40	87	72
5. No visiting of extension officers	100	40	80	95
6. No training programmes	100	80	81	85

Source: JICA Survey Team

(2) Marketing Practice of Farmers

Table 5.3.22 shows the self-consumption and sales of 11 agricultural produce practiced by the sample farmer groups in the 30 subprojects. The 11 produce are popular crops amongst farmers in Himachal Pradesh.

Table 5.3.22 Self-consumption and Sales of Major Crops (Sample Survey)

No	Crop	Growing		Purpose (%)	
		Yes	No	Own use	Sell
1	Maize	27	3	80.0	20.0
2	Paddy/rice	5	25	90.0	10.0
3	Wheat	21	9	88.1	11.9
4	Cabbage	17	13	47.1	52.9
5	Capsicum	12	18	37.3	62.7
6	Cauliflower	22	8	39.1	60.9
7	French bean	13	17	35.4	64.6
8	Peas	27	3	29.4	70.6
9	Potato	23	7	49.8	50.2
10	Tomato	20	10	48.1	52.0
11	Apple	10	20	14.0	86.0

Source: JICA Survey Team

Maize, wheat, cauliflower, peas, potato, and tomato are relatively popular crops amongst the farmers in the 30 subprojects, whilst a smaller number of them grow rice (paddy) and apple. Harvested cereals are mostly consumed by the farmers. In contrast, a major part of harvested vegetables and apples, especially apples and peas, are sold out. Vegetables and apples could be valuable cash crops for the farmers.

Table 5.3.23 shows the direct buyers of the produce for the sample farmer groups.

Table 5.3.23 Buyers of Farm Produce (Sample Survey)

No	Crop	Rural Collector		CA (Mandi)		Local Retailer		Consumer		Inter-state Middleman		Supermarket /Processor	
		Main	Sub	Main	Sub	Main	Sub	Main	Sub	Main	Sub	Main	Sub
1	Maize	3	1	0	0	6	0	0	1	0	0	0	0
2	Paddy/Rice	1	0	0	0	0	0	0	0	0	1	0	0
3	Wheat	2	0	0	0	2	0	0	0	0	1	0	0
4	Cabbage	0	1	8	0	4	0	0	0	0	1	0	0
5	Capsicum	0	0	6	0	1	0	0	0	0	0	0	0
6	Cauliflower	3	0	9	0	6	0	0	2	0	0	0	0
7	French bean	0	0	7	2	7	0	0	0	0	0	0	0
8	Peas	4	0	11	1	5	3	0	3	0	0	1	2
9	Potato	4	0	8	2	4	2	0	2	0	1	0	0
10	Tomato	0	1	9	1	2	2	0	0	0	0	1	0
11	Apple	1	0	6	1	0	5	0	0	0	3	5	0

Source: JICA Survey Team

Major buyers are also clearly distinct from those cereals, vegetables and apples. Whilst cereals are mainly sold to local retailers and rural collectors, vegetables and apples are mainly sold to commission agents (CAs)¹ in Mandis. Local retailers are also relatively important buyers of vegetables and apples. It is interesting that rural collectors are not active in the transaction of vegetables and apples. This situation is different from many developing countries. The table implies that the supply chain of apples and peas for direct marketing to other states are developed to some extent in Himachal Pradesh.

Table 5.3.24 shows the marketing places of the sample farmer groups.

¹ CAs play a role of intermediary in transactions in Mandis by organizing auctions according to APMC system. But farmers may misidentify that CAs are their direct buyers. There is another possibility that many CAs are involved in buying and selling in practice.

Table 5.3.24 Marketing Places of Farmers (Sample Survey)

No	Crop	Farm-gate/ Field		Collection Point in Village		Mandi		Local Weekly Market		Others	
		Main	Sub	Main	Sub	Main	Sub	Main	Sub	Main	Sub
1	Maize	5	1	3	0	2	0	1	0	0	0
2	Paddy/Rice	1	0	0	0	1	0	0	0	0	0
3	Wheat	4	0	0	0	1	0	1	0	0	0
4	Cabbage	0	0	0	0	9	2	4	1	0	0
5	Capsicum	0	0	0	0	6	1	1	0	0	0
6	Cauliflower	3	0	0	0	9	0	4	0	2	0
7	French bean	1	0	0	1	10	3	2	1	0	0
8	Peas	4	0	0	0	12	1	1	3	2	0
9	Potato	4	0	1	0	11	2	2	3	0	1
10	Tomato	0	0	0	0	10	2	3	1	0	0
11	Apple	1	1	0	1	6	5	0	0	5	0

Source: JICA Survey Team

The main marketing places are also clearly distinct from those cereals, vegetables and apples. Whilst cereals are mainly marketed at the farm-gate, vegetables and apples are mainly transacted in Mandis. In the case of vegetables and apples, farmers usually transport their produce to Mandis by themselves and sell the produce to CAs on a commission basis. In addition, local weekly markets serve as additional marketing channels for vegetables for many farmers. It is presumed that farmers bring their produce to local weekly markets and sell them to local retailers or directly to consumers.

Table 5.3.25 shows the means of transportation of the sample farmer groups.

Table 5.3.25 Means of Transportation of Farmers (Sample Survey)

No	Crop	Men (back/cart)		Animals (back/cart)		Bicycle/ Motorcycle		Car/Truck	
		Main	Sub	Main	Sub	Main	Sub	Main	Sub
1	Maize	9	0	1	2	0	1	4	1
2	Paddy/Rice	0	1	0	0	1	0	1	1
3	Wheat	6	1	0	0	1	0	2	1
4	Cabbage	3	7	0	2	0	0	11	0
5	Capsicum	0	4	0	2	0	0	7	0
6	Cauliflower	9	5	0	2	0	0	13	1
7	French bean	1	6	1	1	0	2	11	0
8	Peas	9	7	0	4	0	1	16	0
9	Potato	6	6	0	3	0	1	13	1
10	Tomato	4	5	0	3	0	0	11	2
11	Apple	4	4	1	0	0	0	10	0

Source: JICA Survey Team

The major means of transportation are also clearly distinct from those cereals, vegetables and apples. Cereals are mainly transported by manpower as they are usually sold at farm-gates. Vehicles are a major means of transportation for vegetables and apples, whilst manpower is a subordinate mean. Use of animal power seems to be limited for the transportation of farm produce in Himachal Pradesh.

The following marketing routes of vegetables and fruits at farmers level are envisaged from the discussion about Table 5.3.23 to Table 5.3.25.

- v) Main route: Farmers → CAs (Farmers transport the produce to *mandi* usually by vehicles)
- vi) Sub-route 1: Farmers → Local retailers (Farmers sell the produce at *mandi* or at local weekly market. Farmers sometimes transport the produce by manpower depending on a distance to the selling place)
- vii) Sub-route 2: Farmers → Village Collectors → CAs
- viii) Sub-route 3 (mainly apple and peas): Farmers → Inter-state middlemen/Processors/Supermarkets
- ix) Sub-route 4: Farmers → Local retailers (Farmers sell the produce at local weekly market or

at the roadside. Farmers sometimes transport the produce by manpower depending on a distance to the selling place)

Table 5.3.26 shows market information sources of the sample farmer groups.

Table 5.3.26 Market Information Sources of Farmers (Sample Survey)

No	Information Source	Popularity			Reliability			No Answer
		Very much	So-so	Less/None	Very much	So-so	Less/None	
1	Neighbours	17	7	5	13	5	6	1
2	Commission agents	12	5	9	11	6	11	1
3	Traders/Middlemen	6	6	12	2	10	17	1
4	Agri. extension workers	0	2	22	2	4	22	1
5	Websites (AGMRAKNET, etc.)	3	3	18	4	2	22	1
6	TV/Radio programs	2	6	16	3	7	19	1
7	Newspapers	1	6	17	1	8	20	1

Source: JICA Survey Team

Neighbours and CAs are popular and are considered reliable market information sources for many farmers. Farmers place little reliance in other information sources. It seems that they still have a strong characteristic sense in the rural areas and that they believe a person when they usually see each other. In addition to the fact that public information sources are out of reach from farmers, farmers would pragmatically consider that the reliability of the information sources is not high.

Table 5.3.27 shows the degree of interest of the sample farmer groups in market information.

Table 5.3.27 Degree of Interest of Farmers in Market Information (Sample Survey)

No	Information	Very much	So-so	Less/None	No Answer
1	Daily market prices in Himachal Pradesh	9	2	9	10
2	Daily market prices in Delhi/other states	9	2	9	10
3	Monthly/seasonal market prices in Himachal Pradesh	10	3	7	10
4	Monthly/seasonal market prices in Delhi/other states	7	5	8	10
5	Market supply/demand in Himachal Pradesh	9	4	7	10
6	Market supply/demand in Delhi/other states	6	6	8	10
7	Quality standards	8	7	5	10
8	Market regulations imposed by the governments	5	8	7	10
9	International trade (export and import)	0	0	20	10
10	Buyers who offer a good price	12	5	3	10

Source: JICA Survey Team

The biggest concern of the farmers with market information is the linkage with the kind buyers who offer a good price, and the second biggest concern is market prices. Whilst many farmers are highly interested in (high) market prices, it seems that they want to have a quick and easy way, i.e., finding a good buyer rather than making efforts by themselves to add value to their produce.

The following table shows the difficulties in marketing recognised by the sample farmer groups.

Table 5.3.28 Difficulties of Farmers in Marketing (Sample Survey)

No	Difficulty	Serious	Minor	NA
1	Selling price is low	23	3	4
2	Selling price is not stable (wild price-fluctuation)	23	4	3
3	Difficult to find good markets/commission agents/buyers	8	16	6
4	Long distance to market yards	18	7	5
5	High transportation cost	21	4	5
6	Lack of means of transportation to marketing place	7	17	6
7	Lack of storage facility in the community	24	2	4
8	Lack of reliable market information	18	9	3

Source: JICA Survey Team

It is interesting that many farmers are seriously aware of the issue of the shortage of storage facilities at the community level. After this, market prices (low and unstable) and high transportation cost are their main issues of concern. Several literature have reported that many farmers have complained about the transportation cost as farmers would generally have to bear the cost to Mandi.

The following table shows the countermeasures to address the difficulties discussed by the sample farmer groups.

Table 5.3.29 Countermeasures to Address the Difficulties (Sample Survey)

No	Difficulty	Countermeasure		
1	Selling price is low	Market information	Collection centre and storage facility	Direct selling to companies
2	Selling price is not stable (wild price-fluctuation)	Fix one-day price	Organising farmers group	Storage facility
3	Difficult to find good markets/commission agents/buyers	Introduction of buyers (by govt.)	Organising farmers group	Honest commission agents
4	Long distance to market yards	More Mandis	Direct selling to companies	-
5	High transportation cost	Joint marketing	More Mandis	Direct selling to companies
6	Lack of means of transportation to marketing place	-	-	-
7	Lack of storage facility in the community	Storage facility (cold storage)	-	-
8	Lack of reliable market information	E-trading	Minimum support price	-

Source: JICA Survey Team

Farmers need to be well organised to implement the overall countermeasures. The farmers understanding about the countermeasures could be a positive precondition for mobilising farmer producer organisations (FPOs). However, there are some negative factors. Many farmers still have the tendency to depend on the public sector such as the imposing of fixed price (support price) system and the introduction of buyers. Development of cold storage was discussed as a countermeasure to the shortage of storage facilities. It is an open question whether the idea came out from the farmers actual needs or from bias influenced by the third party such as agricultural extension agents. The Government of India (GOI) pays keen attention in the promotion of a cold-chain system to modernise supply-chains of vegetables and fruits. The GOI's recognition makes a whole lot of sense. However, necessary costs and expected benefits should be carefully analysed before introduction of a cold-chain system at field level. In general terms, individual farmers are the latest beneficiaries of a cold-chain system in the supply-chain, and they will only share the benefit thinly and broadly. A practical suggestion must be given to farmers so that they should fully understand the costs and benefits before developing a cold storage at a community level.

Table 5.3.30 and Source: JICA Survey Team

Table 5.3.31 show the experience in joint marketing by the sample farmer groups and the popularity of joint marketing categorised by major farm produce.

Table 5.3.30 Farmers' Experience in Joint Marketing (Sample Survey)

No	Experience	Number
1	Yes	15
2	No	7
3	No answer	8

Source: JICA Survey Team

Table 5.3.31 Popularity of Joint Marketing (Sample Survey)

No	Crop	Joint Marketing		No Answer and NA
		Popular	Some	
1	Maize	1	1	28
2	Paddy/Rice	0	0	30

3	Wheat	0	0	30
4	Cabbage	8	0	22
5	Capsicum	6	0	24
6	Cauliflower	11	0	19
7	French bean	7	0	23
8	Peas	11	1	18
9	Potato	10	0	20
10	Tomato	8	0	22
11	Apple	4	1	25

Source: JICA Survey Team

Out of the 30 groups, 15 groups (50%) have experience in joint marketing. In the case of cereals, joint marketing was organised only for maize, whilst vegetables and apples were often marketed by joint marketing. Such farmers experience could also be a positive precondition for mobilising FPOs.

The following table shows the evaluation of joint marketing practices by the sample farmer groups.

Table 5.3.32 Farmers' Evaluation of Joint Marketing Practices (Sample Survey)

No	Advantages	Disadvantages
1	Good price/fair benefit	Mixing of different quality of produce
2	Less transportation cost	Poor handling
3	Easy marketing	Low price
4	Less labours and costs	-
5	Time saving	-

Source: JICA Survey Team

Many farmers have been aware of the advantages such as good and fair prices (probably increased bargaining power due to a larger handling lot), cost saving, and easy marketing. On the other hand, they have recognised the disadvantages of mixed handling of different quality of produce, poor handling and low prices. It is remarkably interesting that there are ambivalent evaluations about prices. It is considered that some farmers, who are conscious of high-quality produce, have complained about low prices in a joint marketing practice due to unfair evaluation of their produce.

Table 5.3.33 shows the reasons why a satisfactory joint marketing fails to be practised as discussed by the sample farmer groups.

Table 5.3.33 Reasons of Unsatisfactory Joint Marketing (Sample Survey)

No	Reason	Critical	Minor	No	No Answer
1	No benefit/profit from joint marketing (no difference from individual marketing)	9	8	1	12
2	Want to keep high quality of products without mixing with the products from other members	12	3	3	12
3	Many troubles in managing conflicting interests amongst group members	8	7	3	12
4	No leadership in the community	7	9	2	12
5	No idea how to organise and manage a joint marketing	10	7	1	12
6	No external support	9	8	1	12

Source: JICA Survey Team

Many farmers indicated a mixed handling of different quality of produce as the main reason. It is an important point for smooth implementation of joint marketing that aggregated produce are properly graded in accordance with an agreed quality standard amongst group members.

The following table shows the strategies of increased income from vegetables and fruits discussed by the sample farmer groups.

Table 5.3.34 Farmers' Strategies to Increase Income from Vegetables and Fruits (Sample Survey)

No	Strategy	Very much	So-so	Less/None	No Answer
1	To increase the production by introducing new growing technology	26	3	0	1
2	To change growing season in accordance with market trend	25	4	0	1
3	To improve the quality by introducing new growing technology/varieties	27	2	0	1
4	To improve the quality by improving post-harvest handling	9	19	1	1
5	To introduce organic farming	11	8	10	1
6	To make grading before marketing	15	13	1	1
7	To introduce a new packaging system for easy transportation and for long life	16	13	0	1
8	To introduce storage facilities to control marketing time	20	7	2	1
9	To process the products for value addition	14	13	2	1
10	To find out buyers who offer a good price	22	7	0	1

Source: JICA Survey Team

Many farmers prioritise improved countermeasures in production such as new growing technologies, adjustment of growing season, and new varieties. They are also interested in finding good buyers and establishing storage facilities. They give low priority to countermeasures that add value to farm produce through improved post-harvest practices, processing, and organic farming.

Table 5.3.35 shows the interested advanced farming technologies discussed by the sample farmer groups.

Table 5.3.35 Farmers' Interest in Farming Technologies (Sample Survey)

No	Technology	Very much	So-so	Less/None
1	Irrigation and water saving	26	1	3
2	Soil fertility management and fertiliser application	21	7	2
3	Organic fertilisers /manure production	9	13	8
4	New varieties (seeds/seedlings/saplings)	28	2	0
5	Nursery management	22	6	2
6	Fruits tree management (grafting, pruning, shaping, etc.)	17	10	3
7	IPM and biological pest control	6	15	9
8	Greenhouse and tunnel farming	18	12	0
9	Cold/low-temperature storage	17	10	3
10	Food processing/preservation	17	12	1
11	Packing (material and facility)	17	12	1

Source: JICA Survey Team

Many farmers are interested in new varieties, irrigation and water saving technologies, nursery management technologies, and soil fertilisation technologies. The result clearly implies that farmers have a strong motivation to improve their farming technologies, whilst their motivation for improving post-harvesting and processing is not so high. They are not so much interested in technologies regarding food safety, such as organic farming and integrated pest management (IPM).

Table 5.3.36 shows the strategies to increase household income that were discussed by the sample farmer groups.

Table 5.3.36 Farmers' Strategies to Increase Household Income (Sample Survey)

No	Strategy	Very much	So-so	Less/None
1	To increase the production of basic food crops, e.g., wheat, maize, rice	9	14	7
2	To increase the production of pulses/grams	4	16	10
3	To start or increase the production of vegetables	25	5	0
4	To start or increase the production of fruits	19	8	3
5	To start or increase the production of flowers	7	11	12
6	To increase the number of dairy cow/other livestock	17	12	1
7	To phase-out from farming (considering non-farm jobs/business)	13	7	8

Source: JICA Survey Team

Many farmers consider a high priority on starting or increasing the production of vegetables and fruits. It implies that the idea of crop diversification is becoming popular amongst farmers in Himachal Pradesh. They are also interested in livestock farming. It is interesting that not a small percentage of farmers consider leaving farming as a strategy. This may be a concern on the future agricultural development in Himachal Pradesh.

Chapter 6 Outline of the Proposed Project Scope

6.1 General

In this chapter, the entire frame of the Project is specified based on the analysis of secondary data, sample survey results and detailed project report (DPR) review results. The basic concept and outline of four components are organised and described in this chapter. However the final project scope, implementation plan and cost will be decided through the discussion between JICA and Department of Agriculture (DoA).

6.2 Overall Project Frame

6.2.1 Project Objectives

The purpose of the Project is to raise the income of farmers by improving profitability of agriculture. As proposed in the DPR prepared by the DoA, the increase in income will be achieved by improving the productivity of cereals first, which are the food crops of the target farmers, and diverting the farm land from cereals to highly profitable vegetables without decreasing the production. According to the Study on Comparative Economic Analysis of Crop Diversification between the Project and non-project area in Kangra District, which is the evaluation report of HPCDP I, increases of profit per hectare had been achieved by 2.5 times through diverting the land from cereals to vegetable of only 30% of the total land. The report says the target farmers are still growing vegetables and their income continuously improved. As described in Chapter 5, the need for increase in income through crop diversification is also confirmed by the farmers in the HPCDP II targeted area.

In the DPR, the present income value per hectare and the profit target value per hectare are set to INR 25,000 to INR 145,000, respectively. By looking at the current socioeconomic state of Himachal Pradesh, the agricultural sector gross domestic product (GDP) in Himachal Pradesh is estimated to be INR 96 billion. Since the number of farm household is calculated at 940,000 considering 63% of the total household, the agricultural income per farm household is estimated to be approximately INR 102,000. In this way, there is a difference between the current value obtained from social statistical data and the numerical value described in the DPR, so as mentioned above, it is necessary to set an income target again after the start of the project. Although the target value of INR 145,000 is in line with the national agricultural income policy set forth in Doubling Farmers' Income 2022, it might also be adjusted considering the ground situation and present farmers' income level.

6.2.2 Crop Diversification and Enhancement Plan

(1) Basic Approaches

Approximately 40% of targeted farmland belongs to Zone-1 and currently, grains with small amount of vegetables are produced under rainfed condition. The current grain yields in Himachal Pradesh are 1.80 ton/ha for paddy, 1.90 ton/ha for maize and 1.80 ton/ha for wheat. These are low compared with the average yield in India, namely, 2.43 ton/ha for paddy, 2.62 for maize and 3.05 for wheat. Although Himachal Pradesh State is a mountainous region and there are some disadvantages compared with the mainland, there might be ample room for productivity improvement of cereals through supplying irrigation water, procurement of better agricultural materials and acquiring better cultivation skills. Tomatoes, capsicum, beans, okra, onion and potato, which were cited as high-value ones for crop diversification in the sample survey, are more profitable than conventional crops of cereals. Strategies to increase the level of income by improving productivity of cereal then converting farmland to vegetable without reducing its production amount might be reasonable and can be effective.

On the other hand, since vegetable cultivation is popular in Zones 2 to 4 area, a slightly different strategy may adopt in those areas. Although the productivity of these vegetables is currently high compared with the average in India, there is a large seasonal price fluctuation within the state. In order to achieve income increment, the project encourages qualitative changes in the current vegetable cultivation such as

promotion of off-season cultivation, introducing high-valued new crops and/or changing way of post-harvest handling and marketing.

(2) Strategic Crops

Strategic vegetable crops aiming to diversify from grains are selected for each agro-ecological zone. In the selection, first of all, based on the statistical data and sample survey results, the main vegetables for each agro-ecological zone are identified, and among them, four to nine crops of which the profitability is relatively high and the cultivation technology level/ the cultivation risk is relatively low were selected as strategic crops. The result of the selection is shown in Table 6.2.1.

Table 6.2.1 Evaluation of Existing Crops for Strategic Crops

Name of Crop	Majority in Zone (Yes/No)				Profitability	Market Need	Cultivation Skill	Evaluation ✓ : Selected
	1	2	3	4				
Okra	Yes	No	No	No	○	⊙	○	✓
Brinjal	No	No	No	No	○	⊙	○	
Cucurbits	Yes	No	Yes	No	○	⊙	○	✓
Capsicum	Yes	Yes	No	No	○	○	○	✓
Tomato	Yes	Yes	Yes	No	⊙	⊙	○	✓
Chili	No	No	No	No	○	○	○	
Cabbage	No	No	Yes	Yes	○	○	○	✓
Potato	Yes	Yes	Yes	Yes	○	⊙	○	✓
Radish	No	No	No	No	○	○	○	
Carrot	No	No	No	No	○	○	○	
Cauliflower	Yes	Yes	Yes	Yes	⊙	⊙	○	✓
Garlic	No	No	Yes	No	○	⊙	○	✓
Onion	Yes	Yes	Yes	No	○	○	○	✓
Pea	No	Yes	Yes	Yes	⊙	⊙	○	✓
Beans	Yes	Yes	Yes	No	○	○	○	✓
French Beans	No	No	No	No	○	○	○	
Ginger	No	No	No	No	⊙	○	○	
Broccoli	No	No	No	No	⊙	○	⊙	
Sarson	No	No	No	No	○	○	○	
Red cabbage	No	No	No	No	⊙	○	⊙	
Coriander	No	No	No	No	○	○	○	

Remarks: Profitability: ⊙=very good, ○=good, △=not bad

Market Need: ⊙=very good, ○=good, △=not bad

Cultivation skill: ⊙= skill required, ○=popular

Source: JICA Survey Team

Based on the above evaluation of the existing crop, agro-ecological zone-wise strategic crops are summarized as follows.

Table 6.2.2 Aro-ecological Zone-wise Strategic Vegetables Crop Diversification Scenario

Cropping Season	Agro-Ecological Zones			
	Zone-1 (240m to 1,000m)	Zone-2 (1,001m to 1,500m)	Zone-3 (1,501 to 3,250m)	Zone-4 (over 3,250 m)
Kharif	Okra Capsicum Cucurbits Tomato Beans	Potato Capsicum Tomato Onion Beans Cabbage Cauliflower	Tomato Cabbage Cauliflower Pea	Pea Cauliflower Cabbage Potato
Rabi	Onion Potato Cauliflower	Potato Capsicum Onion Cauliflower Pea Beans	Cabbage Cauliflower Pea Potato Garlic Onion	Pea Cauliflower Cabbage Potato

Source: JICA Survey Team

Common farmers have no doubt to follow the existing cropping seasons. Existing cropping season is

almost fixed, depending on climatic condition such as temperature, rainfall, etc. Production is fluctuated depending on the climatic condition; therefore, its price is also fluctuated. If cropping season are shifted, considering the fluctuation of prices, it is expected that more profit be obtained when harvesting season will meet higher period of produces.

It is understandable that farmers have insufficient information on produces, marketing, seeds, chemicals, pests and diseases, etc. Progressive farmers have tried to get more useful information from private seed shops, traders, commission agents (CA), etc. Consequently, it is expected that farmers select promising crops/ varieties by themselves and sell their produces with higher profit.

Meanwhile, according to Table 5.1.3, it is intimated that orchard isn't included in CCA, therefore fruit trees aren't recognized as strategic crops. However, should farmers desire to cultivate fruit trees after implementation of the project, farmers would be supported to cultivate them under extension service of Department of Horticulture.

(3) Crop Diversification Scenario

The target number of farmers in the 306 subprojects is 25,500 while the target irrigation area is 7,933 ha. The farmland targeted by the project is about 35% of the farmland owned by the above farmers. The area is 0.35 ha/farmer on average. The scenario of the crop diversification plan in the target area aimed at by the project is as follows.

Table 6.2.3 Crop Diversification Scenario

Items	Season	Crop	Unit	Before Project (Condition)		After Project (Condition)	
Cultivation Area	Rabi	Wheat	ha	6,164	(Rainfed)	4,237	(Irrigated)
		Vegetable	ha	1,063	(Rainfed)	3,370	(Irrigated)
		Fallow	ha	707	-	327	-
		Total	ha	7,934	-	7,934	-
	Kharif	Maize	ha	5,806	(Rainfed)	4,083	(Irrigated)
		Paddy	ha	326	(Rainfed)	228	(Irrigated)
		Wheat	ha	49	(Rainfed)	49	(Irrigated)
		Vegetable	ha	1,465	(Rainfed)	3,574	(Irrigated)
		Fallow	ha	287	-	0	-
		Total		7,934		7,934	
	Yield Target of Major Crops	Tomato	ton/ha	16.0	(Rainfed)	40.0	(Irrigated)
Cauliflower		ton/ha	9.3	(Rainfed)	23.5	(Irrigated)	
Pea		ton/ha	5.6	(Rainfed)	12.6	(Irrigated)	
Potato		ton/ha	6.6	(Rainfed)	20.0	(Irrigated)	
Wheat		ton/ha	1.8	(Rainfed)	2.9	(Irrigated)	
Maize		ton/ha	1.9	(Rainfed)	2.7	(Irrigated)	
Paddy		ton/ha	1.8	(Rainfed)	2.9	(Irrigated)	

Source: JICA Survey Team

6.2.3 Overall Project Frame and Approaches

As the new agricultural ordinances come into force, Himachal Pradesh, which is dominated by smallholders as mentioned above, will have a risk for inefficient trade under liberalisation of agricultural marketing. The additional costs due to inefficient distribution are burdened by small-scale producers who do not have negotiating power and farmers may not be able to enjoy the appropriate benefits of crop diversification. In addition, individual trade with small-scale farmers may be unattractive to distributors or collectors, which narrow the options of farmers for selling their farm produce. It is therefore that the organisation and strengthening of Farmers' Producer Organisation (FPO) tried in HPCDP I will be continued in HPCDP II. It is assumed that a total of ten FPOs will be formed for each collection centre to be constructed, and FPO will take the initiative in post-harvest processing and function as an interface between distribution and production. One FPO covers an average of 30 subprojects and 750 (ha) production areas. One Krishak Vikas Association (KVA) will be formed in each subproject to take a key role in the production and operation and maintenance (O&M) of the rural

infrastructure to be constructed in the subproject level. Although one FPO covers 30 KVA and 2,400 farmers in calculation, the FPO will be operated by selected 300 to 500 motivated farmers. In general, the criteria for selection of member of FPO will includes as follows.

- i) Having surplus farm produce, value added products etc.
- ii) Willingness to become the shareholder of the FPO
- iii) Should possess Interest in the FPO activities

The FPO will be established based on the lessons learnt from one FPC named HAVI established under HPCDP I. HAVI is the registered company with authorized share is INR 20 million.

The feature of HAVI is summarized as follows.

Table 6.2.4 Feature of HAVI

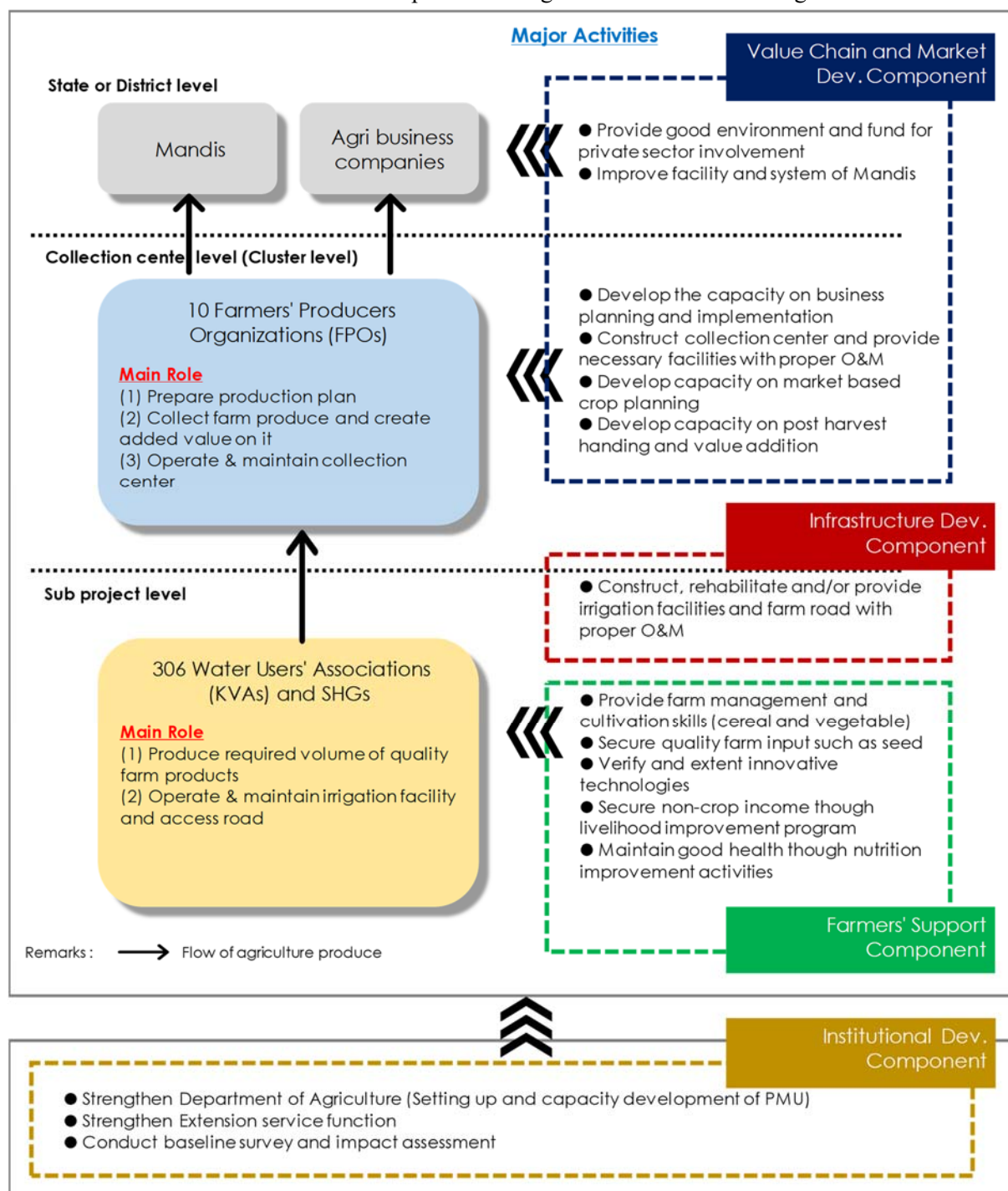
Feature	Description
Registration	Registration with Registrar of Companies, Central Registration Centre, GOI, under section 465(1) of the companies act, 2013. Part IXA of Companies' Act 1956 with 11 Promoter Members on 8/03/2019. Present authorised share capital is INR 2.0 M.
Membership/ Shareholders	No. of KVAs – 31, No. of SHGs- 5, No. of KVMS- 4 up to March 2020. Other start-ups, KVAs, SHGs, and individual farmers are waiting to subscribe to the shares.
Dealing Item	More than 200 MT of wheat, 70 MT of Paddy, 5 MT of local Pulses, 50 MT of vegetables, 11 MT of Apples, 5 Mt of SHG processed food articles including pickles, vermicelli, turmeric powder, murabba, chutney, wheat seera etc. have been mobilised by the FPC till date.
Way of marketing	Formation of WhatsApp Groups of different category of customers for day to day update on fresh farm produce (F&V) along with the other non-perishable products. Also Started Home Delivery for the online orders. Presently there are 18 such groups with more than 500 clientele. These groups are being given daily rate list of fruits and vegetables along with information on other products through promotional messages.
Major Activities with potential producer/buyer partners	<ul style="list-style-type: none"> - Organic Mandya Farmers' Cooperative, Mandya, Bangalore: Sending 5 product Samples - Ojas Himalayan Products: Supply of Turmeric, Ginger, Curry Leaves - CSKHPKV Palampur: Organic Tea has been procured for pilot testing in the HAVI - Tea Board of India: Meetings with the Officers at Palampur office undertook. - SWAN Women Federation: Association initially was for including their spices in our retail chain, but recently their capabilities as a producer associate for HAVi branding - SEWA Ahmadabad, collaboration lead to procurement of pulses and spices for HAVi. - Vyas Kamdhenu, Bilaspur: Collaboration path has been discussed in meeting with its executive. Dairy products like milk, curd, cheese, butter have been roped in for the customers of HAVi. - Beekeepers: Around 20-25 Beekeepers and their Groups from District Hamirpur and Kangra have been identified. Honey from 5 different kind of flora has been roped in to the HAVi Brand for marketing. - Sataun Spice Growers Association, Dealing with production and marketing of Garlic, Turmeric, Ginger, Kali Jeeri, both fresh, seed purpose and processed to the tune 100 MT identified as potential producers for bulk supplies of spices for marketing under the HAVi brand. <p>For increasing marketing outreach of the HAVi brand Products shared samples of the HAVi products with different buyers/organizations:</p> <ul style="list-style-type: none"> - Sahyadri Farmer Producer Company, Nashik: Total 18 product Samples - Organic Mandya Farmers' Cooperative, Mandya, Bangalore: 5 product Samples - SEWA, Ahmadabad: Total 17 product samples - Roots and Flowers, Palampur: Total 9 product Samples - Amatrorganic, New Delhi: 3 product samples

Source: JICA Survey Team

The DPR proposes four components, namely: (1) infrastructure development component, (2) farmers' support component, (3) value chain and marketing development component and (4) institutional development component. Some of these activities are targeted at FPOs responsible for marketing activities and some activities are targeted at KVAs responsible for production. It also includes activities

targeting Mandis and the private companies that are responsible for the distribution and processing of products.

The main activities included in each component are organised as shown in the figure below.



Source: JICA Survey Team

Figure 6.2.1 Major Activities in the Three Layers in Four Project Components

6.3 Infrastructure Development Component

As mentioned in Chapter 5, the content of the DPR proposal was confirmed through a sample survey regarding its necessity. Considering the results in HPCDP I, the content of the proposal under DPR is generally valid and will be the basic infrastructure to support improving farm income through crop diversification. On the other hand, a preliminary evaluation of water resources resulted in some questions on the observed flow rate by DoA for 20 out of 296 subprojects. Regarding these 20

subprojects, it is necessary to check the flow discharge at the intake point again before making the final section as a project target.

The summary of infrastructure development component is shown below.

6.3.1 Minor Irrigation

Based on the requirement as countermeasure to the present constraint of irrigation component for crop diversification, which was confirmed through series of interaction/workshop with the farmers and block agriculture officers, the basic strategy for irrigation development will focus on the following: development of minor irrigation systems, improvement of existing irrigation system, development of small-scale irrigation facilities, efficient water management and rain water harvesting.

(1) Selection Criteria

The DoA and Project Management Unit (PMU) of HPCDP I have selected the subprojects, which are listed in short and standby lists based on the following selection criteria: 1) Willingness of the community to participate and take over O&M; 2) Water availability; 3) Location of the farms; 4) Size of the holdings and CCA; 5) Economic status of the beneficiaries; 6) Topography of the area availability of technical information; and 7) Environmental aspect. Although the subprojects were once selected in 2018 when DoA prepared the draft DPR, they have been reviewed and some subprojects have been replaced with new subprojects from the standby list in 2020.

The number of subprojects will be 306 which consist of 296 sub-projects proposed by DoA and 10 sub-projects from convergence components with IPHD. The 10 subprojects have not yet decided but irrigation facilities have already constructed in the subprojects and micro irrigation system will be applied there. In addition, 49 subprojects which meets below selection criteria are listed in standby list. Those subprojects will be selected when some subprojects of above 306 subprojects are cancelled at the implementation stage because other scheme and project target them etc. Above 296 sub projects and 49 standby subprojects are summarized in Attachment 6.3.1 as long list.

Table 6.3.1 Selection Criteria of Subprojects

No.	Item	Description
1	Willingness of the community to participate & take over O&M	Written consent of the farmers and Gram Panchayat General observation during group discussion
2	Water availability	Perennial water is there and available for irrigation
3	Location of the farms	Less than 1 km and 10 minutes from public roads
4	Size of the holdings and CCA	More than 5 ha
5	Economic status of the beneficiaries	House is normal condition and some farmers have machineries such as 2-wheeler/ 4-wheeler and agriculture tools such as tractors/ power tiller/ weeder from general observation
6	Topography of the area availability of technical information, etc.	Area should not be too hilly and should be suitable for crop diversification
7.	Environmental aspect	Though subprojects which fall into the "Category A" as per the JICA Guidelines are not anticipated in the Project, the following scale of subprojects is regarded as "Category A". Construction of embankments/dams with water reservoir area of more than 100 ha Development of more than 100 ha agricultural area

Source: JICA Survey Team

(2) Subcomponents of Minor Irrigation

The components of each subproject are clarified in this preparatory survey. Those necessities are verified by DoA staff and PMU staff of HPCDP I when the investigations for selection of subprojects were conducted.

Table 6.3.2 Proposed Infrastructure (1/2)

	Unit	Bilaspur	Chamba	Hamirpur	Kangra	Kinnaur	Kullu
Subproject	No.	19	16	23	60	3	26
CCA	ha	293	296	307	2,289	19.5	643
Water Harvesting Structure	No.	12	-	5	18	-	2
Percolation Well	No.	-	-	10	2	-	-
Pump House	No.	12	-	22	14	-	2
Protection Work/Spur	No.	33	-	46	157	-	-
Pumping Machinery	No.	12	-	22	19	-	2
Tube Well	No.	-	-	1	-	-	-
Rising Main	m	6,415	-	10,580	11,200	-	1,500
Main Delivery Tank	No.	12	-	22	16	-	2
Distribution System (HDPE Pipeline)	m	49,500	19,290	81,845	91,200	11,000	39,300
Outlet Chamber	No.	490	160	1,062	1,399	10	279
Sluice Valve Chamber	No.	-	-	191	229	-	-
Nallah (Surface Water) Crossing/ Road Crossing	No.	16	-	20	42	-	-
Retaining Wall	No.	32	206	34	241	-	157
Diversion Weir	No.	-	17	-	43	-	22
Intake Chamber	No.	10	16	-	37	2	61
Main Channel	m	-	11,165	-	96,985	-	23,380
Pucca Field Channel	m	-	5,700	-	59,850	600	31,850
Storage Tank (No.)	m	39	28	14	37	-	20
Others		SOP SW Fencing	Gate DS Gate	SOP Dyke Sump Well	DS Gate DS SOP	DS	SOP Gate

Note: SOP means Supply of Power, SW means Sump Well, DS means Dropping Structure, WMD means Water Measuring Devices
Source: JICA Survey Team

Table 6.3.3 Proposed Infrastructure (2/2)

	Unit	Lahaul and Spiti	Mandi	Shimla	Sirmour	Solan	Una
Subproject	No.	21	54	24	9	22	19
CCA	ha	634	1,381	476	272	579	243
Water Harvesting Structure	No.	-	6	-	-	2	7
Percolation Well	No.	-	7	-	3	5	1
Pump House	No.	-	15	-	3	7	19
Protection Work/Spur	No.	-	2	-	5	4	-
Pumping Machinery	No.	-	14	-	3	7	19
Tube Well	No.	-	-	-	-	-	10
Rising Main	m	-	9,100	-	4,900	7,000	8,275

	Unit	Lahaul and Spiti	Mandi	Shimla	Sirmour	Solan	Una
Main Delivery Tank	No.	-	17	-	3	7	19
Distribution System (HDPE Pipeline)	m	61,500	212,490	13,690	22,975	11,050	70,000
Outlet Chamber	No.	281	3,111	448	28	200	686
Sluice Valve Chamber	No.	-	-	-	-	2	-
Nallah (Surface Water) Crossing/Road Crossing	No.	-	4	-	6	4	11
Retaining Wall	No.	83	192	2,889	29	744	33
Diversion Weir	No.	21	41	20	5	8	-
Intake Chamber	No.	39	41	24	9	49	-
Main Channel	m	28,300	80,950	63,820	2,200	20,300	-
Pucca Field Channel	m	14,800	0	46,100	2,900	5,700	-
Storage Tank (No.)	m	20	81	29	16	17	4
Others		Gate GI/RCC Pipe, DS	SOP Gate	Gate DS WMD	SOP GI Pipe	GI/RCC Pipe, Gate, DS Fencing, WMD	SOP

Note: SOP means Supply of Power, SW means Sump Well, DS means Dropping Structure, WMD means Water Measuring Devices,
Source: JICA Survey Team

6.3.2 Micro Irrigation Systems

(1) Selection Criteria of Farmers

KVA will recruit candidate farmers who will be provided Micro Irrigation System (MIS) under below selection criteria.

- iv) The farmer should have willingness to take up vegetable cultivation.
- v) The farmer should agree to share the MIS with other farmers.
- vi) The farmer should take responsibility for O&M from his own expenses.

(2) Target Area

To avoid wastage of important natural resources and raise irrigation efficiency, micro irrigation system is planned to be installed in 276 ha in lift irrigation schemes and tube well irrigation schemes. Also, it is to be installed in 560 ha in flow irrigation schemes.

Micro irrigation system is ideally suitable for close-spaced crops like vegetables. With the help of this system, 40% increase is expected in the irrigated area with the same amount of water compared with surface method of irrigation. The overall efficiency of the system is above 80% and no land is wasted in making bunds and channels and about 40-60% saving in labor compared with surface irrigation. At the time of installation of MIS, expected crop, size of field, and needs of water storage tank or booster pump, etc., shall be checked with the service provider, extension officer/ junior engineer and farmers.

Table 6.3.4 District-wise Projections of Micro Irrigation System

Sr. No.	District	Total CCA	Area under LIS and TW	Area under FIS	Micro Irrigation System for LIS & TW		Micro Irrigation System for FIS	
					Area under Drip	Area under Micro and Mini Sprinkler	Area under Drip	Area under Micro and Mini Sprinkler
					(5% of CCA)	(10% of CCA)	(5% of CCA)	(5% of CCA)
		(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha.)
1	Bilaspur	293	293	0	15	30	0	0
2	Chamba	296	0	296	0	0	15	15
3	Hamirpur	307.4	307.4	0	15	30	0	0
4	Kangra	2289	411	1878	21	42	94	94
5	Kinnaur	19.5	0	19.5	0	0	1	1
6	Kullu	643	30	613	2	4	31	31
7	Lahaul and Spiti	634	0	634	0	0	32	32
8	Mandi	1381	358	1023	18	36	51	51
9	Shimla	476	0	476	0	0	24	24
10	Sirmaur	272.35	64	208.35	3	6	10	10
11	Solan	579.16	129.16	450	6	12	22	22
12	Una	243	243	0	12	24	0	0
		7433.41	1835.56	5597.85	92	184	280	280
					276		560	

Source: DoA

6.3.3 Catchment Area Treatment

Catchment area treatment of the proposed irrigation systems is required to help recharging the streams/nallahs, which will further provide water for irrigation throughout the year. Under this component, wire crates and silt retention structure are included. Details are shown as follows:

Table 6.3.5 District-wise Projections of Catchment Area Treatment

District	Item	Bilaspur	Chamba	Hamirpur	Kangra	Kinnaur	Kullu	Lahaul and Spiti
Catchment Area Treatment	Wire Crates (No.)	12	13	15	38	2	20	9
	Silt Retention Structure (No.)	16	10	22	50	1	10	10
District	Item	Mandi	Shimla	Sirmaur	Solan	Una	Total	
Catchment Area Treatment	Wire Crates	38	17	5	15	5	189	
	Silt Retention Structure	44	14	6	14	7	204	

Source: DoA

6.3.4 Solar Pumping

In Himachal Pradesh, yearly sunlight hours are enough and it is presumed that suitable and feasible sites for installing Photovoltaics (PV) system are available to energise pumping machinery for lifting water. There are 103 subprojects of Lift Irrigation Scheme (LIS) and Shallow Tube Well (STW) including new and improvement scheme and solar pumping is expected to be installed to 83 LIS and STW subprojects as shown in below table. It seems to be difficult to install solar pumping system at the remaining subprojects because there are difficulties identified such as agreement of land use for solar panel, etc.

Table 6.3.6 District-wise Projections of Number of Solar Pumps

District	Bilaspur	Chamba	Hamirpur	Kangra	Kinnaur	Kullu	Lahaul and Spiti
Solar Pump (Number of Subproject)	16	0	16	15	0	2	0
District	Mandi	Shimla	Sirmour	Solan	Una	Total	
Solar Pump (Number of Subproject)	8	0	3	7	16	83	

Source: DoA

6.3.5 Access Farm Roads

Majority of the existing farm paths/roads are generally very narrow and unpaved, where movement of human beings, motorcycle, bicycle, mules, etc., is allowed. During the HPCDP II on crop diversification, it was observed that poor condition of roads is one of the major constraints in smooth diversification as labour cost for carrying the produce from farm to market road increase. Timely transportation of farm produce, as an approach to the producing area, is the key for harvesting profits from farm produce. Therefore, it is proposed to construct/rehabilitate the 62.4 km farm access roads from the existing road linkages covering.

Table 6.3.7 District-wise Projections of Access Farm Road Length

District	Bilaspur	Chamba	Hamirpur	Kangra	Kinnaur	Kullu	Lahaul and Spiti
Access Farm Road (km)	2.35	7.6	0.6	27.2	0	3	0
District	Mandi	Shimla	Sirmour	Solan	Una	Total	
Access Farm Road (km)	4.75	10	1	5	0.9	62.4	

Source: DoA

6.3.6 Solar/Electric Fencing for Protection of Vegetables and Food Grains

(1) Selection Criteria of Farmers

KVA will recruit candidate farmers who will be provided with solar/electric fencing under the below selection criteria.

- i) The farmer group has the priority to have solar fencing.
- ii) The farmer should agree to deposit farmer share according to type of fencing.
- iii) The farmer should take responsibility for the O&M using his own expense.

(2) Projections of Solar/Electric Fencing Length

Based on the DoA's survey, farmer's requirements on solar/electric fencing are estimated as follows:

One of the potential risks in farming is the damage to crops by stray or wild animals. In Himachal Pradesh, aside from the wild animals, farmers are exposed to risk of crop damage by monkeys. It is estimated by the Department of Agriculture and Horticulture, Government of Himachal Pradesh that an area of 1.95 lakh ha. is permeated by monkeys and other wildlife species, which annually causes loss of profit to the tune of INR 300 crores to the farmers.

Although, the Government of Himachal Pradesh has taken up some initiatives under the "Mukhya Mantri Khet Sarankshan Yojana", the initiatives are not fruitful due to small and scattered land holdings. In order to address this problem, this project is also planned. The project share would be 90% out of the total cost and beneficiary share is 10%.

Table 6.3.8 District-wise Projections of Solar/Electric Fencing Length

District	Bilaspur	Chamba	Hamirpur	Kangra	Kinnaur	Kullu	Lahaul and Spiti
Length of Solar Fencing (km)	23.6	9.8	26.3	179.9	2.6	52.3	51.3
District	Mandi	Shimla	Sirmour	Solan	Una	Total	
Length of Solar Fencing (km)	110.1	38.4	21.9	49.9	20.4	293.22	

Source: DoA

6.3.7 Convergence Component with IPHD

(1) Procedure of Subprojects Selection

Once all the institutions are set up, the project will start identifying the appropriate locations, where the IPHD has already developed an irrigation system. Also, the farmers will demand more interventions from the government to either extend the existing distribution system or get capacity building trainings to diversify their cropping pattern. Upon identification of such location/site, the project assesses the technical feasibility of intended interventions and obtains the No Objection Certificate (NOC) from IPHD to modify the existing system in terms of customisation of existing distribution system for irrigation through micro irrigation system or any other distribution channel as distribution pipe.

(2) Implementation Structure

IPHD manages its constructed irrigation facilities and their O&M costs are covered by IPHD itself. In case of DoA's construction, irrigation facilities will be handed over to KVA and a KVA member will be the executor of O&M of the facilities.

Table 6.3.9 Implementation Structure of Construction and O&M in Convergence Component

Stage	Convergence Component (10 Sites)	
	Facilities	Executor
Construction	Main distribution system (already done)	IPHD
	Additional distribution system (if any)	DOA
O&M	Main distribution system	IPHD
	Additional distribution system (if any)	KVA

Source: JICA Survey Team

6.3.8 Infrastructure Development Support

Since the area to be developed with irrigation facilities requires proper O&M, strengthening of KVA and federation of these associations at different levels is important for sustainability of the system. Minor O&M works are to be carried out by KVA. Major activities to be undertaken under this sub-component are strengthening of KVA for improvement of water management and strengthening of O&M activities. Different activities to be undertaken under this programme are the induction workshop for community motivators, awareness camp involving community, formation and formalisation of farmers group. Capacity development of Market Development Component (MC) members, training of Self Help Group (SHG) members and its office bearers will be covered under capacity development of farmers groups. Workshops for cluster and apex federation and facilitation of these federations will be conducted to strengthen O&M of infrastructure.

6.4 Farmers' Support Component

6.4.1 General

The farmers' support component is an important activity toward the realisation of the crop diversification scenario shown above. The component includes formation and strengthening of KVA, vegetable promotion, research and development (R&D) support by strengthening State Agriculture University (SUA), innovative activity, livelihood support activity and nutrition improvement. The approach and contents of these sub-components are summarised below.

6.4.2 Formation and Strengthening of KVA

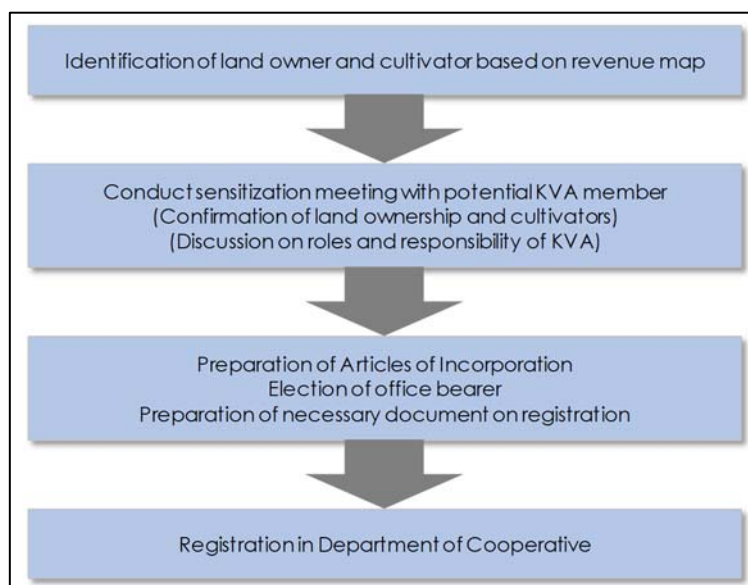
(1) General

One KVA is formed for each sub-project, and KVA operate and maintain the village infrastructure such as irrigation facilities and roads to be constructed or rehabilitated under the Project. The KVA also functions as a focal point for all activities carried out on a sub-project level except activities targeting SHGs such as livelihood and nutrition improvement activities.

Members of KVA are required to have or cultivate land on the target cultivable command area. Therefore, when establishing KVA, the members will be confirmed based on the land ownership or

actual cultivation situation. KVA will be established before the DPR for irrigation facility development is formulated, and KVA will provide the information necessary during formulating the DPR. The formulated KVA will be registered with Department of Cooperative.

Engineers belonging to BPMU will provide a series of support for organizing KVA. BPMU staff will first explain to KVA members the purpose of establishing KVA and the functions required of KVA, giving an example of KVA showing the good performance in HPCDP I and necessary sensitization will be provided. During the meeting, preparation of the articles of incorporation, selection of office bearers preparation of required document for registration will be made. The procedure for establishing KVA is as shown in the Source : JICA Survey Team



Source : JICA Survey Team

Figure 6.4.1 Procedure to Establish KVA

Figure 6.4.1.

After preparation of DPR, construction work will be carried out. Before completion of the construction work, the capacity development training on operation and maintenance of irrigation and other infrastructure will be carried out by the BPMU. In the training, KVA will develop an operation and maintenance plan for infrastructure facilities. After the transfer of the facility, KVA will start to maintain the facility according to the O&M plan formulated. BPMU will give the necessary follow up training and advise through out project period.

(2) Strengthening of Capacity for O&M

The contents of O&M training are given below

- i) Conduct workshop to discuss principles and practices of irrigation and water management.
- ii) Conduct training on water use planning for equitable water distribution.
- iii) Conduct field training on basic engineering skills with reference to land levelling, water courses, field channels, etc.
- iv) Conduct training to MC Members (officer bearers) on participatory management processes including leadership, communication and conflict resolution.
- v) Conduct training on accounting principles and practices; accounts, book keeping, financial audit and financial disclosures.
- vi) Training on credit management.
- vii) Conduct training and prepare guidelines to ensure the transparency of water management so that water can be used fairly regardless of social position or gender.

(3) Application of Japanese Cases

In addition to the above training and on-the-job training, the following Japanese cases will be helpful in order to establish the maintenance of the facility in KVA after the facility is constructed.

- i) Usage of guidelines and manuals (guide for functional conservation of irrigation facilities which are issued by Ministry of Agriculture, Forestry and Fisheries) in stock management: In particular, it is expected that the concept of prioritization of facility, facility soundness evaluation, and facility monitoring will be applied.
- ii) Integrated management of agricultural irrigation facility stock information data system: By accumulating and managing data, it is possible to grasp the deterioration status of facilities

over time, improve the accuracy of deterioration prediction, and perform efficient and rational maintenance. With the introduction of ICT technology, it is expected that a database of maintenance information on irrigation facilities will be created over time and integrated management by DOA.

In addition to the above training and on-the-job training, the following Japanese cases will be helpful in order to establish the maintenance of the facility in KVA after the facility is constructed.

6.4.3 Vegetable Promotion

(1) Incubation and Capacity Development of Community Motivators

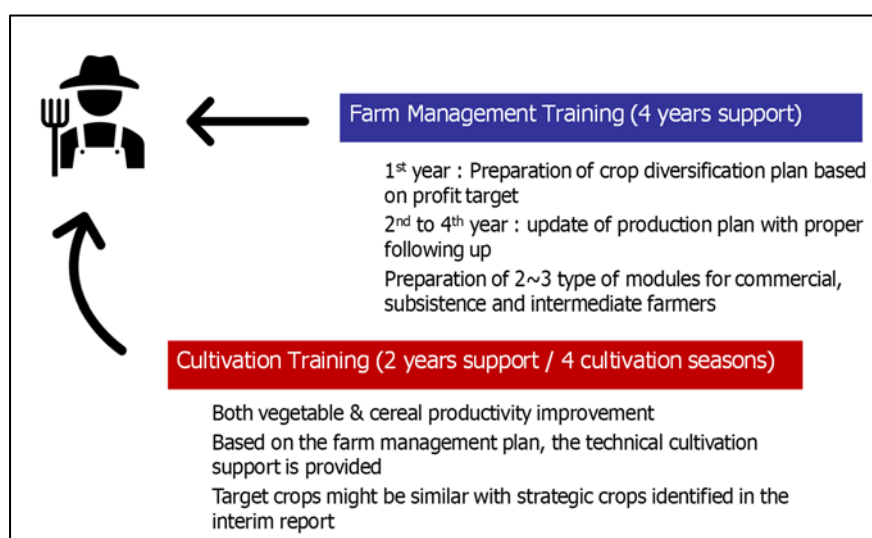
The employment and incubation of community motivator, which was also adopted in HPCDP I activities, will be implemented in HPCDP II. The community motivator is selected from other villages nearby the target village with sociological academic background. The selected community motivator will coordinate all activities in the target subproject and support the PMU. Since the activities in HPCDP II are more diverse than in HPCDP I, two community motivators consist of one male and one female will be employed. The following training will be conducted on capacity building of community motivator. The salaries of community motivator will be paid during the project implementation period.

- i) Introduce advanced community motivators activities in HPCDP I
- ii) Aware the roles and responsibility on community motivators in the project
- iii) Conduct facilitation training
- iv) Conduct exposure visit to the advance area to have a clear image of the goals and expected activities

This activity will specifically target the employment of male and female community motivators and build their capacities through a series of trainings. The community motivators whose task is to mobilise and create awareness among the project beneficiaries, will ensure the active participation of the women in field consultations; facilitate women's decision-making in implementing the programme; facilitate women farmers' participation in agriculture training that is imparted to men; ensure that the place and timing of the trainings are fixed keeping in mind, the convenience of women; enable and facilitate women farmers to absorb the learnings from the different agriculture trainings imparted to farmers and operationalise them for their benefit (gender-friendly agriculture); and, create/facilitate special market spaces for women to sell their produce.

(2) Training of Farm Economy Management and Training and Demonstration on Vegetable and Food Grain

Training on farm economy management and cultivation skills will be conducted with due consideration of farmers' skills and motivation. In principle, farmers will be categorised into three groups: conservative, intermediate and advanced farmers. Conservative farmers are basically not so positive for crop diversification as well as cultivation of commercial crops, they have less interests to the improvement of their skills. Intermediate farmers are interested in getting more



Source : JICA Survey Team

Figure 6.4.2 Training of Farm Economy Management and Training and Demonstration on Vegetable and Food Grain

production and more profit, but not so positive. Meanwhile, advanced farmers have high interests to better their situation, try to improve their skills and earn more profit.

Especially for conservative farmers, continuous support is needed until they realise the effect of crop diversification. In addition, as described in Chapter 4, HPCDP I was specialised in the transfer of cultivation technology, and it did not provide support from the perspective of farm management according to the actual situation of the farmer. Therefore, it is undeniable that crop diversification has been imposed on farmers. From that reflection, in parallel with the cultivation technology, proper guidance on cultivation planning for the purpose of improving farm management, should be provided and motivate the farmers for crop diversification from the farmer's perspective. The farm management between conservative and commercial farmers might be different. In case of conservative farmers, low input and low-risk type of management may be preferred, while market-oriented management aiming at high return is more suitable for commercial farmers.

In HPCDP II, farm management capacity will be strengthened through four years of follow-up, and cultivation skills training will be conducted through the four cropping seasons (two years) (see figure). The main training contents are as summarised in the table below.

Table 6.4.1 Outline of Agriculture Training and Demonstration

Types of Training	Contents	Number of Farmers Targeted	Remarks
Farm Economy Management, Training on Farm Management by Farm Type (Advanced, Intermediate and Conservative)	Intensive training (1st year) / Follow-up training (2nd to 4th year) 1) Support for resources inventory of each farmer 2) Support for set the profit target of each farmer 3) Support to understand the market needs and trend of vegetable 4) Support to understand the necessary cultivation skills and resources and risks 5) Support to prepare the cropping calendar based on above analysis 6) Conduct training on record keeping of cultivation	25,500	<ul style="list-style-type: none"> • Subjects (topics) for training to be identified on the basis of farmers' needs or problems. • Subjects (topics) could be various depending on farmers as well as subprojects. • Trainers should prepare action plan to clarify purpose, activities, outputs and outcomes. • Monitoring and evaluation are required.
Practice of Vegetable Crops Training cum Method Demonstration on Cultivation	Conduct training and field demonstration (2 crops x 4 or 8 demonstrations x 4 seasons) 1) Support on selection of quality seed and seedling with nursery management 2) Conduct training on overall cultivation management for respective crops 3) Conduct training on integrated pest management 4) Conduct training on irrigation management 5) Conduct training on farm mechanisation 6) Conduct training on difference on farming practices between open field and protected cultivation 7) Promotion of organic farming, soil moisture conservation techniques 8) Awareness on post-harvest processing and marketing	8,000	<ul style="list-style-type: none"> • Following demonstrations are proposed on the basis of farmers' needs or problems. • Cropping pattern demonstration • Block demonstration • Single season demonstration • Package demonstration • Trainers should prepare action plan to clarify purpose, activities, outputs and outcomes. • Monitoring and evaluation are required. • Several field days should be convened.
Food Grain's Productivity	Conduct training and field demonstration (2 crops x 2 demonstrations x 4 seasons) 1) Support on selection of quality seed and seedling	1,200	<ul style="list-style-type: none"> • Following demonstrations are proposed on the basis

Training and Demonstration	with nursery management 2) Conduct training on overall cultivation management for respective crops 3) Conduct training on integrated pest management 4) Conduct training on irrigation management 5) Conduct training on farm mechanisation 6) Conduct training on difference on farming practices between open field and protected cultivation 7) Promotion of organic farming, soil moisture conservation techniques 8) Awareness on post-harvest processing and marketing		of farmers' needs or problems. <ul style="list-style-type: none"> • -Cropping pattern demonstration • -Block demonstration • -Single season demonstration • Package demonstration • Trainers should prepare action plan to clarify purpose, activities, outputs and outcomes. • Monitoring and evaluation are required. • Several field days should be convened.
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Source: JICA Survey Team

The scheduled numbers of training and field demonstration are summarised in the following table. If these activities are carried out only by the staff in PMU, the extension staff of the PMU will be heavily burdened, and there is a concern that the quality of the activities will deteriorate. Therefore, HPCDP II will carry out dissemination activities using resources in the State Agriculture University, KVK, advanced farmers, private companies and FPOs. In HPCDP II, a small satellite office will be established between the subproject and the Block PMU Office in order for PMU agricultural extension workers to efficiently manage training and field demonstrations. This will shorten the travel time and enable more efficient dissemination activities for the extension officer.

Table 6.4.2 Number of Trainings and Field Demonstrations and Methodology

Types of Training	Number of Trainings		Number of Field Demonstrations		Methodology
	Total	Per Year	Total	Per Year	
Farm Economy Management, Training on Farm Management by Farm Type (Advanced, Intermediate and Conservative)	9,500	2,400	-	-	-Lecture in each subproject -Lecture in training institutes for representative of beneficiary farmers
Training cum Method Demonstration on Cultivation Practice of Vegetable Crops	-	-	32,200	8,000	-Demonstration of proposed farming practices in plots to be selected -Arrangement of inspections with farmers for sharing proposed practices -Monitoring and evaluation
Food Grain's Productivity Training and Demonstration	-	-	4,900	1,200	-Demonstration of proposed farming practices in plots to be selected -Arrangement of inspections with farmers for sharing proposed practices -Monitoring and evaluation

Source: JICA Survey Team

In case of farm management training for advanced farmers, the concept and experience of the JICA's initiative of Small Horticulture Empowerment Project (SHEP) can be utilised. The concept of SHEP approach is thinking from the economic theory "grow to sell" and based on a psychological theory "a mechanism for unlocking farmer motivation". Basic steps for SHEP approach are mentioned below¹.

- Step 1 Selection of target beneficiaries and sharing the vision/goal (sensitisation workshop, selection of target district, selection of target beneficiaries)

¹ https://www.jica.go.jp/english/our_work/thematic_issues/agricultural/shep/concepts.html

- Step 2 Awareness of current situation and new information (preparatory baseline survey, stakeholder forum, market survey)
- Step 3 Decision making (crop selection, action plan making)
- Step 4 Provision of technical solution (in-field trainings after Training of Trainers (TOT))

JICA says that key points for these steps are: 1) participatory baseline survey carried out by farmers and extension officers together, 2) stakeholder forum for farmers to contact and discuss with actors from agricultural industry sector, and 3) demand-driven technical training for farmer's requirement identified in the market survey.

The essence of SHEP approach is the farmer's decision making based on their own collected information and analysis on the potential market for conducting agricultural business.

The preliminary assessment for adaptability of SHEP approaches in HPCDP II is summarised as follows:

Table 6.4.3 Preliminary Assessment for Adaptability of SHEP Approaches in HPCDP II

Title	Description
Agricultural Market Situation in Himachal Pradesh	The concept of the Project is to improve farmer's income by the diversification of farm crops from cereal to vegetable due to market demand. The situation of agricultural market in target area in Himachal Pradesh is: farmers are conducting farming for commercial basis and/or self-consumption in small scale currently; vegetable prices are set according to the balance of market supply and demand, which can say that market mechanism is functioning properly; farmers can select and access physically to market or buyer freely. Therefore, it is possible for the farmers in Himachal Pradesh to conduct agricultural business with market-oriented practice. For the acceleration of market-oriented agriculture, one option to be considered is the Smallholder Horticulture Empowerment & Promotion (SHEP) approach developed by JICA.
Adaptability of SHEP Approach	<p>In the Project, supportive activities for farmers are planned to be organised from three layers: 1) subproject level, 2) collection centre level (cluster level), and 3) state or district level. At the first layer, basic technical support on crop cultivation and livelihood improvement are planned for bottom-up of farmers with infrastructure development in subproject level. At the second layer, support on establishment and capacity building of FPOs to be joined by advanced farmers will be conducted in collaboration with agribusiness operators at the collection centre. At the final layer, mandis and private sector of agribusiness will be supported to activate farmers agriculture business.</p> <p>In this process, FPOs of the second layer are the core for farmers to generate market-oriented mind because they can communicate directly with agribusiness operators who have the demand or opinion on purchasing crops. FPOs can realise the preferable price and the requirement of products from collecting the information on the operators' needs, and consider action plan to be taken to meet the needs. The Project is planned to support to conduct FPOs' matching to agribusiness operator and prepare action plan by themselves including necessary technical training (business management, operation of collection centre, value-addition of crops, etc.) and connecting to existing financial scheme.</p> <p>Once FPOs acquire market-oriented idea from the above process, they can share the idea not only within FPOs but also to other farmers not participating in FPOs. Then, farmers around FPOs will begin to produce the commodities with required quality to achieve the demanded scale of agribusiness operators. Therefore, the viewpoint of SHEP approach based on farmers' decision making can be applied for income improvement of farmers of the project site from the incubation of FPOs.</p> <p>However, the details of how to apply SHEP approach to the target farmers are not clarified due to limited implementation of site survey by the JICA Survey Team. The detailed activities and steps shall be considered after the start of the Project based on the situation of the target sites and farmers.</p>

Source: JICA Survey Team

(3) Provision of Farm Machinery

Farm mechanisation plays an important role in providing optimal utilisation of resources and economy in time and also in reducing drudgery of farm operations. This judicious use of time, labour and resources facilitates sustainable intensification (multi-cropping) and timely planting of crops, leading to an increase in production and productivity.

The physiography of farms and the practices of farm operations need a selective approach for the right kind of induction of farm machinery like manually operated implements, self-propelled small machinery and more use of mini tractors, power tillers and power weeders for ease of doing farm operations in small and terraced field. This is going to increase timeliness of operations as well as reduction in drudgery of operation. It has also been observed that the agriculture involvement of female workers is more compared with male workers. Therefore, gender issue needs to be considered for farm operations

and light weight farm implements and machinery holds key position for the induction of new farm equipment for food grain as well as for vegetable cultivation.

Meanwhile, necessity of operation and maintenance should be reminded, and briefing on periodical maintenance work should be given to users by supplier of farm machinery.

The farm machineries to be provided to the farmers are summarised in the following table.

Table 6.4.4 Summary of Procurement of Farm Machinery

No.	Name of Machinery	Specification	Qt'y
Tractor / Power Tillers / Power Weeder			
1	Tractors	(i) Tractor (08-15 PTO HP) (ii) Tractor (15-20 PTO HP)	306
2	Power tillers	(i) Power tiller (Below 8 BHP)	306
3	Power weeder	(i) Power weeder (engine operated below 2 BHP)	612
		(ii) Power weeder (Above 2 BHP)	306
Tractor/Power Tiller (Below 20 BHP) Driven Equipment			
4	Land preparation / seed bed preparation	(i)MB plow (ii) Disc plow, (iii) Cultivator, (iv) Harrow, (v) Leveler blade, etc.	306
5	Equipment for harvesting	(i) Thresher, (ii) Multi crop threshers, (iii) Paddy thresher, (iv) Brush cutter, (iv) Winnowing fan, (vi) Maize sheller, (vii) Reaper, (viii) Mower	306
6	Chaff cutter	Operated by engine/electric motor below 3 HP power tiller, and tractor of below 20 BHP tractor)	918
7	Grass weed slasher		306
Manual/Animal Drawn Equipment/Implements/Tools			
8	Land preparation / seed bed preparation	(i) MB plow, (ii) Disc plow, (iii) Cultivator, (iv) Harrow, (v) Leveler blade, (vi) Furrow opener, (vii) Ridger, (viii) Peddler	306
9	Sowing and planting equipment	(i) Paddy planter (ii) Seed cum fertiliser drill (iii) Raised bed planter (iv) Planter (v) Equipment for raising paddy nursery (vi) Seed treating drum	306
10	Harvesting and threshing equipment	(i) Thresher (ii) Winnowing fan (iii) Maize sheller (iv) Feed block machine	306
11	Post hole digger/augur	Simple and non-mechanical equipment	306
Other Equipment			
12	Manual knapsack sprayer	Foot operated sprayer	612
13	Powered knapsack sprayer/power operated	Capacity 8-12 lts	612
14		Capacity 12-16 lts	612
15		Capacity above 16 lts	306
16	Eco-friendly light trap	Subprojects having CCA <25 ha (109 nos.)	109
17		Subprojects having CCA >25 ha (197 nos.)	394

Source: DoA

The selection of beneficiaries will be carried out by the following process and the final decision will be made by BPMU. The machinery will be provided with cost-sharing basis contributed 50% of the actual machinery cost by the Project.

Table 6.4.5 Selection Procedure for Beneficiary of Farm Machinery

Procedure	Description	Implementor	Supporter
STEP 1 Inventory survey	KVA conducts inventory survey of agricultural machinery targeting neighbouring villages and confirm the rationality to provide the machinery to the respective subproject	KVA	Community motivators
STEP 2 Nomination of potential beneficiaries	Confirm the motivation of farmers based on the information of farm management strategies obtained through farm economy management training. Also, confirm financial status of the potential beneficiaries whether they can bear the cost.	KVA	Community motivators
STEP 3 Selection of beneficiaries	From the list of candidates listed from the subprojects under their jurisdiction, the information obtained will be scrutinised and candidates who are valid and	BPMU	Community motivators

	expected to be effective will be selected as beneficiaries.		
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Source: JICA Survey Team

(4) Provision of Poly House and Ploy Tunnel

Vegetable cultivation in poly houses gives very high yield and the quality of produce is very good. It provides cover against natural calamities also. This activity has already been tested in HPCDP I and there is great scope to expand this in HPCDP II. The poly houses of different sizes shall be installed on farmers' fields on cost sharing basis. Besides vegetable, nursery production is also very remunerative in poly houses and can produce nursery in advance.

The selection of the potential beneficiaries is carried out by the KVA first by looking at the performance of the farm economic management and field demonstration of vegetable and availability of the fund for cost sharing. The community motivator will support for fair selection of the candidate in the village. After selection of the potential beneficiaries in each subproject, the BPMU will decide the beneficiaries within available budget.

Users are requested to prepare business plan for sustainable operation and proper O&M as one of the documents for application.

Table 6.4.6 Provision of Poly House and Poly Tunnel

No.	Item	Specification	Qt'y
1	Training cum method demonstration (low tunnels) for vegetable seedlings	3.6 m ² per unit Miniature versions of high tunnels	1,184
2	Installation of walk-in tunnels	Size:40 m ² (10 m x 4 m) For 109 subprojects having CCA <25 ha: 2 no.	218
3	Installation of walk-in tunnels	Size:40 m ² (10 m x 4 m) For 197 subprojects having CCA >25 ha: 4 nos.	748
4	Naturally ventilated greenhouse	105 m ² poly house including MIS	50
5	Small poly houses	105 m ² poly house	306

Source: JICA Survey Team

(5) Programs for the Next Generation

Programs for the next generation will likely involve the youth both those who are undergraduate and looking for career. In collaboration with the agriculture college and industrial training institute, 30 target students will be selected in the conduct of the program with utilisation of their facility. Educating and exposing the youth to the farming sector technologies across the food supply chain will enable them to make up their mind in taking up a career in agriculture. Proposed programs will not only motivate the youth to choose education on farming sector but also to take up capacity building and entrepreneurship avenues in this sector.

The contents of the next generation program are summarised as follows. The program will be outsourced to National Bank for Agriculture and Rural Development (NABARD) / NABARD Consultancy Services (NABCONS) or other consulting firm who has the experience in entrepreneurship of small business in the rural area.

Table 6.4.7 Programs for the Next Generation

(1) School Students

Title	Contents	Target	Duration of Activities (Days)	Numbers of Activities To Be Carried Out
Orientation to the extension staff (PMU)	- Awareness on the implementation of activities for the next generation - Confirmation of implementation schedule	Staff of DPMUs and BPMUs	1	2

Sensitisation program for potential participants	Orientation workshops with targeted schools	Students in 70 schools	1	2
Motivation courses and basic of farming	Motivation cum training of organic farming	70 schools x 30 students	1 season	2
Workshop on basic and various options suitable in the food supply chain Entrepreneurship development in farming sector	Quiz and nursery assessment	70 schools x 30 students	1	2
	Quiz at the BPMU level	50 students x 14 BPMUs	1	2
Leadership development program	Youth Leadership Training Program at the SPMU level	14 BPMUs x 5 students	1	2
Study / exposure visit to various enterprises	Study cum exposure visit to SAU/IHBT Palampur/subproject area of HPCDP-JICA-ODA	14 BPMU x 5 students	1	2
Specialised counselling for different entrepreneurship	Quiz cum model assessment	14 BPMU x 5 students	1	2
Concluding function	Wrap-up workshop	Students and other stakeholders	1	1

Source: DoA / PMU, 2020

(2) Young Farmers

Title	Contents	Target	Duration of Activities (Days)	Numbers of Activities To Be Carried Out
Orientation of the extension staff (PMU)	- Awareness on implementation of activities of the next generation - Confirmation of implementation schedule	Staff of DPMUs and BPMUs	1	12 (3 times each DPMU)
Sensitisation program for potential participants	Selection of youth from selected KVAs, 5 youth from 2 KVAs per BPMU: 140 youth	10 youth/ 2KVAs/ time/ BPMU	1	42 (3 times each BPMU)
Motivation courses and basic of farming	Orientation and awareness on basics of modern farming techniques, resource pooling, supply chain, FPC (at DPMU level) followed by identification and grouping for the next level: 30 to 40 youth selected by the BPMUs, 2-day duration	30 to 40 youth/ DPMU	2	12 (3 times each DPMU)
	Happiness/motivational program DPMU Level: 5-day course for 30 to 40 youth	30 to 40 youth/ DPMU	5	12 (3 times each DPMU)
Workshop on basic and various options suitable in the food supply chain Entrepreneurship development in farming sector	Advanced awareness program on crops/enterprises:	30 to 40 youth/ SPMU	1	6 (2 times x 3 years)
	Trainings and exposures to innovative farm technologies 50 youth at a time SPMU level	30 to 40 youth/ SPMU	5	3 (one time/ year)
	Conducting of demonstrations in line with the marketing opportunities including FPC	2 KVAs/ BPMU	One season	84 (14BPMUs x 2 seasons x 3 times)
	Assessment through field days and follow-up workshop DPMU level	30 to 40 youth/ DPMU	1	12 (3 times each DPMU)
	Identification of enterprises/crops for the advanced program (at DPMU level)	Some youth, staff of DPMU and BPMU	1	6 (2 times a year x 3 years)

Title	Contents	Target	Duration of Activities (Days)	Numbers of Activities To Be Carried Out
	Preparation of business plan at BPMU/DPMU level for the participating groups/individuals: at least 4 business plans to be prepared for each DPMU	30 to 40 youth/ DPMU	1	12 (4 times a year x 3 years)
Leadership development program	Advanced farming workshops on the key issues of business plan, 2 days at DPMU level	30 to 40 youth/ DPMU	2	12 (4 times a year x 3 years)
Study / exposure visit to various enterprises	Exposures/Trainings: Selected interventions/activities 5 to 10 participants	5 to 10 youth	5	6 (2 times a year x 3 years)
Specialised counselling for different entrepreneurship	Assistance in business plan execution and linkages with the FPC and market:	5 to 10 youth	5	12 (4 times a year x 3 years)
Preparation of business plan	Exhibition of the successful business plans for further dissemination.	Selected youth, Staff of DPMU / BPMU, and stakeholders	1	12 (4 times a year x 3 years)

Source: DoA

6.4.4 R&D Support and Infrastructure Development in SAU

(1) R&D Support

The project will invest in pilot research with the aim of utilising new technologies in the future. These activities contribute to the achievement or sustainability of project outcomes during or after project implementation. The activities are mainly outsourced to two agricultural colleges, Parampur and Solan, and the quality of research results is managed by PMU. The progress and results of the activities will be confirmed quarterly, and a result report meeting will be held every year.

The summary of the R&D support activities is as follows:

Table 6.4.8 Summary of R&D Support

Name of Activities	Objective	Contribution to the Project Outcomes	Duration
Multi-location testing of CMS based hybrids of cauliflower in Himachal Pradesh	New hybrids of cauliflower shall be made available for cultivation in the state	Introduction of new high yielding varieties of cauliflower to farmers in the Project.	3 years
Multi-location testing of GMS based bacterial wilt resistant hybrids of chili in Himachal Pradesh	New hybrids of chili shall be made available for cultivation in the state	Introduction of new high yielding varieties of chili to farmers in the Project.	3 years
Generation of double haploid through induced androgenesis in head cabbage (<i>Brassica oleracea var. capitata</i> L.)	Development of potential double haploids	It is expected that new varieties be introduced for the project.	3 years
Multilocal testing and validation of newly developed bacterial wilt resistant and high yielding bell pepper lines/hybrids in Himachal Pradesh	Identification of elite bacterial wilt resistant bell pepper lines/hybrids for different agroclimatic zones of Himachal Pradesh	It is expected that tolerant bell pepper varieties to bacterial wilt be newly introduced and applied by farmers of the project.	2 years
Multilocal testing and validation of newly developed yellow vein mosaic virus resistant and high yielding okra lines/hybrids in Himachal Pradesh	Identification of elite yellow vein mosaic virus resistant okra lines/hybrids for different agroclimatic zones of Himachal Pradesh.	It is expected that new varieties of okra be introduced to farmers of the project.	2 years
Development and promotion of management technology against insect-pests of <i>brinjal</i>	Development of pest management module on eco-friendly approaches	It is expected that useful pest management module be introduced in the project, and	2 years

Name of Activities	Objective	Contribution to the Project Outcomes	Duration
		production would be increased.	
Management of root-knot nematode, <i>Meloidogyne incognita</i> in cucumber under protected cultivation	Development of effective management tactics under poly house conditions for the management of root knot nematode	It is expected that production of vegetables in poly houses would be improved, further product quality would be also increased.	2 years
Assessment, validation and refinement of disease management technology for vegetable crops	Refinement and development of integrated disease management technology in vegetables.	It is expected that damage by diseases be mitigated.	3 years
Enhancing rice production in high-altitude areas of Himachal Pradesh by development and popularisation of high yielding, cold tolerant Japonica Rice varieties through farmers' participatory approach.	Development and popularisation of high yielding Japonica Rice varieties	New market of Japonica Rice might be created for the project.	3 years
Genetic amelioration of Kala zeera (<i>Bunium persicum Boiss</i>) using tissue culture/micropropagation approach	Development of efficient micro propagation technology to shorten the seed to seed cycle and enhancement of seed germination with technological interventions.	It is expected that quality seeds be introduced for the project.	3 years
Popularisation of potential A B C crops of North Western Himalayas as vegetables and seeds under organic and natural farming conditions through participatory plant breeding. (A B C= Amaranthus, Buckwheat and Chenopodium)	Availability of quality planting materials Increase in income of farmers	New market would be created in and around the project.	3 years

Source: DoA

(2) Infrastructure Development for Vegetable Seed Production in SAU

The objectives of infrastructure development for vegetable seed production in the State Agriculture University (SAU) are to establish the modal seed production farm by utilising/harnessing the maximum potential of the university land resource by developing new farm area to put under quality seed production, create irrigation facilities, infrastructure and its protection against wild and stray animals. The target seeds are nucleus, breeder, foundation and certified of vegetables, pulses, oilseeds, forage and grasses, spices and cereals. SAU will supply quality seeds to the farmers and diversify the traditional cropping pattern and Human Resource Development (HRD) in seed production of vegetables and other crops through trainings to farmers and enable them to produce the seeds on their own.

The project components are summarised as follows:

Table 6.4.9 Summary of Vegetable Seed Production in SAU

Name of Activities	Description
Identification of compact area in the university farm	An area of 20 ha compact block has been identified at the Banuri Farm of the University in Palampur
Cleaning of area	This area is presently covered with wild/unwanted bushes, trees, abandoned tea plants and has become the hide-out for breeding of wild and stray animals. Presently, the area is of no economical use. Wild and abandoned tea plants will be cleaned/uprooted from the area.
Terrace construction	The area so cleaned will be developed to cultivable terraces by cutting the soil profile to an average of 0.75 m.
Farm road construction	For easy approach and movement of farm machinery, farm road of about 3 km with 2.4 m width will be constructed around and between the area.
Irrigation development	The area is rain-fed and to harness appropriate productivity of the crops, irrigation facilities are mandatory to be created. In the mid-hills, borewells are not a viable option in long term due to poor recharging of underground water sources as run-off losses occur during the rainy season. Therefore, the water from perennial source (khud) from a distance of about 6 km has been proposed. The water from this source will be pumped and through underground GI pipeline will be supplied to RCC water storage tank of 5.0 lakhs litres

	capacity. This will ensure the regular water supply in the area throughout the growing season. This water will be further distributed to different blocks of the area through underground pipes and 5 other storage tanks, each of 50,000 litres capacity will be constructed. One abandoned borewell in the area will also be rejuvenated to meet out some irrigation requirement.
Provision of sprinkler irrigation system	For effective use of water to harness maximum outcome, sprinkler irrigation system will also be installed.
Provision of fencing/boundary wall	The proposed area to be put under seed production is surrounded by local villages, hence need to be protected from illegal aggression. Thus, a boundary wall/fence has been proposed to be constructed over a length of about 3.6 km. This will also help in providing protection to the farm area from wild/stray animals which otherwise cause huge losses to the seed crop.
Provision of farm machinery	Farm machinery is essential for the mechanical cultivation of the crops. Therefore, provision for tractors with required farm implements has been proposed.
Construction of storage	A provision has been made to construct a seed godown of 3000 quintals seed storage capacity along with the construction of covered threshing floor, etc.
Provision of seed processing machinery:	To improve the quality of raw seed, seed processing plant is mandatory. One such plant of 1.5 t capacity will be installed with the accessories like indented cylinders, specific gravity separators, seed dryer, weighing and packing machines.

Source: DoA

6.4.5 Innovative Activities

Innovative activities aim to disseminate advanced technologies for farmers for productivity improvement. New centre of excellence (COE) will be established for provision of quality seedling for vegetables such as tomato to the member of KVAs. The COE will be utilised for pilot business trial to facilitate the collaboration between FPO and agribusiness operators. The summary of innovative activities is shown below.

Table 6.4.7 Summary of Innovative Activities

No.	Item	Objectives	Specification	Qt'y
1	Establishment of centre of excellence for vegetable nursery production	- Sales of quality seedlings - Demonstration on production of quality seedlings - Dissemination on skills on seedling production	- Hi-tech green house: 560 m ² - Fan and pad system - Shade net house with covered area of 250 m ² - Solar PV pump (2HP) - Shallow tube well	2 nos.
2	Trial for soil less cultivation/	- Pilot testing and demonstration on advanced technology	- Fan and pad greenhouse with vertical system - 250 m ²	1 no.
3	Provision of tubular structure shade net houses	- Demonstration on production of quality seedlings and plants - Demonstration on protects from natural weather disturbances such as wind, rain, hail and frost.	- 250 m ² shade net house	50 net houses
4	Provision of plastic mulching material	- It is completely impermeable to water. - To facilitate fertiliser placement and reduce the loss of plant nutrient through leaching. - To provide a barrier to soil pathogens	- 10,000 m ² per subproject	306 subprojects
5	Provision of anti-hail nets in hail prone areas	- To protect fruit and vegetables against hail	- 500 m ² per subproject	153 subprojects

Source: DoA

6.4.6 Livelihood Improvement Activities

In the target subproject area, there are a certain number of landless, e.g., women-headed family and physical disabilities. The rate of those famers is estimated at around 10% of the total household. Since

crop diversification poses a great risk for these farmers, some farmers hesitate to diversify crops to vegetable cultivation. In the HPCDP II, livelihood improvement activities will be implemented for these socially vulnerable farmers to boost their crop diversification.

The Project will select one active Self-Help Group (SHG) per subproject to support livelihood activities. The selection will be carried out based on the needs and present activities performed by SHG by checking the amount of savings and/or credit and number of meeting conducted. Moreover, considering the objective of this activity, majority of the members should be as follows:

- i) Female-headed households and single women (widowed / separated / deserted / unmarried)
- ii) Women / men under BPL category
- iii) Women / men with disability, but capable of doing in-house non-farm production
- iv) Marginalised and vulnerable women / men (SC/STs and women in difficult circumstances)
- v) Landless women / men

The project will provide the opportunity on sensitisation training and exposure visit to the SHGs before starting the actual implementation of the activities. The contents of sensitisation training are 1) orientation of farmers to develop objectives and strengthen consciousness, 2) training for SHG members on role and responsibility of office bearers and introduction of key topics for farmers group and 3) exposure visit of advanced farmers organisation in Himachal Pradesh State. The gender awareness training for empowerment of SHGs, where nearly 300 SHGs will be targeted, covering approximately 3000 households of the project area. This training is aimed at strengthening and firming up women's identity, building their self-confidence and personhood, that facilitates their decision making and enhances and improves their negotiation and bargaining skills. The training content will underline Gender Sensitisation (for SHGs/Men and Youth); Gender Division of Labour (for Women, Men and Youth) so that women's unpaid workload is recognised and men begin sharing household chores; and VAW with specific focus on Domestic Violence (for SHGs – as DV has increased since the pandemic broke out) is highlighted. The awareness and sensitisation is expected to enable men understand the underlying causes of gender-based violence and help in the reduction of domestic violence. As a result of the trainings, it is expected that the unequal gender relations between men and women, will be improved towards achieving equal relations

The livelihood improvement activities include beekeeping, mushroom cultivation, livestock farming, poultry farming, inland fishery, shiitake mushroom cultivation and vocational skills training. The outline of livelihood improvement program is shown in the following table.

Table 6.4.10 Summary of Livelihood Improvement Activities

Name of Activities	Contents	Number of target farmers
Mushroom cultivation	<ol style="list-style-type: none"> 1) Conduct awareness workshop on mushroom and select the beneficiaries 2) Provide equipment and material of mushroom for 700 farmers 3) Provision of necessary training on cultivation management and marketing 4) Users are requested to periodically report its management to PMU 	700
Raring of honey bees	<ol style="list-style-type: none"> 1) Conduct awareness workshop on honey bees and select the beneficiaries 2) Provide equipment and material of honey bees for 280 families (10 colony apiary per unit / 20 farmers per BPMU x 14 BPMUs =280 farmers (units)) 3) Provision of necessary training on cultivation management and marketing 4) Users are requested to periodically report its management to PMU 	280
Dairy Farming	<ol style="list-style-type: none"> 1) Conduct awareness workshop on dairy farming and select the beneficiaries 2) Provide equipment and material of dairy farming for 70 units (2 cows/buffaloes per unit) / 5 farmers per BPMU x 14 BPMUs =70 units 3) Provision of necessary training on cultivation management and marketing 4) Users are requested to periodically report its management to PMU 	140
Back yard poultry	<ol style="list-style-type: none"> 1) Conduct awareness workshop on back yard poultry and select the beneficiaries 2) Provide equipment and material of back yard poultry for 500 units (50 chicks per unit) 	300

		3) Provision of necessary training on cultivation management and marketing 4) Users are requested to periodically report its management to PMU	
Service Sector	Training	Conduct the vocational training for 1,200 farmers on the following subjects 1) Motor/Farm machinery/ Scooter Mechanic 2) Hospitality & Tourism 3) Mobile Repair 4) Pumping-with special focus on HDPE/GI Pipes and Accessories 5) Driving of farm machinery/commercial vehicles 6) Electrician 7) Computer & Internet for Online Trading, Banking, Correspondence, Record Keeping, etc. 8) Bamboo Craft 9) Tailoring/Knitting	1200
Promotion of	Shiitake Mushroom Cultivation	Shiitake Cultivation Training Centre is planned to be established and becomes fully functional to serve farming communities by increasing their annual income and to provide training to Shiitake growers. 1) Manufacturing sawdust blocks (Target 36,000 blocks) 2) Selling sawdust blocks to farmers 3) Training of farmers on Shiitake cultivation and processing 4) Dissemination of Shiitake cultivation to be conducted by DOA's Shiitake Experts (3 staff) 5) Market research for selling packed Shiitake by farmers to be conducted disseminators, Shiitake expert of PMC, and marketing officers of SPMU and DPMUs	1,125
Promotion of on	farm of fish culture	1) Conduct awareness workshop on fish culture and select the beneficiaries 2) Development and management of fish culture (50 m3, cost sharing, 50 units) 3) Provision of necessary training on cultivation management and marketing 4) Users are requested to periodically report its management to PMU	30

Source: DoA

The activities will be carried out by cost sharing basis with consensus of each SHG. The sharing rate will be varied based on the financial capacity of the beneficiaries.

6.4.7 Nutrition Improvement

Three activities are proposed under nutrition improvement.

(1) Dissemination of recipes using nutritious ingredients:

The aim is to promote and popularise consumption of underutilised/unutilised/unknown but nutritious foods that are easily available, are low cost or can be produced in kitchen gardens.

Although now the people in Himachal Pradesh have adopted and included many new varieties of foods in their diet, the problem of micronutrient malnutrition and obesity still remains. The inclusion of varieties in diet alone is not helpful. It has to be supported with improved methods of cooking so that maximum benefit can be derived from the food. Besides this, the amount of food consumed by a person also makes a lot of difference in terms of the amount of nutrients obtained from that particular food. At the same time, it is also important for the beneficiaries to understand the importance of nutrition in their life.

Fifty selected recipes will be compiled in a recipe book both in Hindi and English. These recipes consist of vegetables and other foods that are rarely used but are very nutritious. Simple steps will be given in the book for each recipe along with the picture of the dish. Information regarding the nutritive value of each prepared dish/recipe will also be given. Looking at the pandemic situation when direct trainings and demonstrations are not possible, videos of recipe demonstration may be made and shared through YouTube or any other medium.

During the dissemination not only the recipes but education related to the nutrient content of the recipe and how much of the portion of the particular recipe will give what amount of daily required nutrients

will be shared with the participants. The project may also share video/PowerPoint presentation on general nutrition information with special focus on quality and quantity of food (Amount of food to be included from each food group)- balanced diet, video/PPT on anaemia – prevalence, consequences, treatment and prevention through diet modification; and video/PPT on obesity – prevalence, consequences, treatment and prevention through diet modification.

(2) Promotion of school garden

The main aim of setting up or promoting a school garden is to give students a lifelong skill and develop a habit of adapting diverse varieties of nutrient rich food from the very beginning.

Children learn with eagerness and enthusiasm when learning is not just confined to books and is converted into activities. The practical knowledge which they gain via doing things by themselves or with their peers/ friends/ schoolmates remains with them throughout their lifetime. Thus, the activity may be categorised as a next generation activity because it is going to have a long lasting and sustainable effect on the coming generation. This will bring about a desirable behavioural change in the young generation for their healthier future.

For the promotion of school garden nutrient rich vegetables will be used like, Amaranth, beetroot, bok choy/pak choi, broccoli, carrot, green soya bean, kale and Swiss chard. Besides school garden, small activities for school children to teach nutrition may be carried out. These may include jigsaw puzzle games, match the vegetable with nutrient game, colours and vegetables, stories, videos, etc.

A seed kit will be provided in each school. This kit will contain eight small packets of seeds mentioned above vegetables. The seeds used should be open pollination type so that it is only one-time investment and the schools can further produce their own seeds and vegetables. Orientation of teachers, staff and students regarding importance of nutrition will be done prior to the activity. Support in terms of arrangement of water supply and provision other gardening related resources will be given.

(3) Dissemination of kitchen garden for nutrition improvement

Aim: To promote diet diversity for nutrition improvement by using underutilised nutrient rich foods through self-consumption from home kitchen gardens.

Promotion and development of home-based kitchen gardens has been part of the CDP project but this activity was again done on a very small scale. Now, there is a need to scale up the practice of kitchen gardens to promote increased consumption of diverse and nutrient-rich food. The theme of National Nutrition Month (Poshan Maah) under the POSHAN Abhiyaan is also ‘Plantation drives for promotion of kitchen gardens’. It is thus a favourable time to promote kitchen gardens as it is also a government priority. For dissemination of kitchen garden, same nutrient rich vegetables (as mentioned in school garden activity) will be used like, Amaranth, beetroot, bok choy/pak choi, broccoli, carrot, green soya bean, kale and Swiss chard. Job aids/ ready reckoners may be provided. These may be in the form of pamphlets or small booklets. Videos/ PPTs may be shared/shown for general nutrition awareness generation. A seed kit will be provided in each household. This kit will contain eight small packets of seeds of the eight abovementioned vegetables. The seeds used should be open pollination type so that it is only one-time investment and the farmers can further produce their own seeds and vegetables.

For improvement of the nutrition status of farmers in the targeted subprojects, the following activities are proposed.

Table 6.4.11 Proposed Activities on Nutrition Improvement

No.	Plan	Target	Content
1	Dissemination of recipes using nutritious ingredients	Approximately 3,000 households and 40 schools (with 10 staff in each school approx.) will be covered. 300 SHGs, 160 PMU staff and 160 DOA staff members will be trained for this purpose.	Fifty selected recipes compiled in a recipe booklet both in Hindi and English. Each household will receive one booklet, each school staff will receive one booklet, each SHG member and other training participant will also receive one recipe booklet. Total booklets required is 5,000. These recipes consist of vegetables and other foods that are rarely used but are very nutritious. Simple steps are given in the booklet for each recipe along with the picture of the dish. Information regarding the nutritive value of each prepared dish/recipe is also given.

No.	Plan	Target	Content
			Videos of recipe demonstration. Video on general nutrition information with special focus on quality and quantity of food (Amount of food to be included from each food group) – balanced diet. Video on anaemia – prevalence, consequences, treatment and prevention through diet modification. Video on obesity- prevalence, consequences, treatment and prevention through diet modification. Approximately 53 videos of 50 recipes and general information regarding nutrition will be made. These may be circulated through YouTube or any other online source.
2	Promotion of school garden	Teachers, staff and students have to be involved in gardening.	General orientation on following subjects will be conducted. - Importance of nutrition for good health and well being - Nutrient rich foods - How to grow own food for diverse and healthy diet? - Provide seed kit, one kit per school. Each seed kit will contain separate small packets of seeds of the eight mentioned vegetables. - Make arrangements for regular water supply - Provide support for development of school garden, preparation of soil, fertilisers, pots, small gardening equipment, etc. For the promotion of school garden nutrient rich vegetables will be used like, Amaranth, beetroot, bok choy/pak choi, broccoli, carrot, green soya bean, kale and Swiss chard. Besides school garden, small activities for school children to teach nutrition are carried out. These include jigsaw puzzle games, match the vegetable with nutrient game, colours and vegetables, stories, videos, etc. Such activities are interesting and children learn very fast about good nutrition and health. Job aids/ ready reckoners may be provided. These may be in form of pamphlets or small booklets.
3	Dissemination of kitchen garden for nutrition improvement	SHGs	General orientation on the following subjects will be conducted. - Importance of nutrition for good health and well being - Nutrient rich foods - How to grow own food for diverse and healthy diet? - Provide seed kit, one packet kit per household. Each seed packet will contain separate small packets of seeds of the eight mentioned vegetables. Number of households to be covered = 3,000 and number of SHG members will be 300. A total of 4,000 seed kits will be required (including school activity). For dissemination of kitchen garden same nutrient rich vegetables (as mention in school garden activity) will be used like, Amaranth, beetroot, bok choy/pak choi, broccoli, carrot, green soya bean, kale and Swiss chard.

Source: JICA Survey Team

6.5 Value Chain and Market Development Component

6.5.1 Roles of Public Sector and Development Strategy

A series of Government of India (GOI) agricultural market reform policies aim at demolishing a monopoly market system of APMC model (*mandi*) and promoting entry of the private-sector including farmers into the marketing and processing business in order to stimulate market dynamism, reduce the costs and increase farmers' income. With progress of the policies, GOI expects that the public sector steps down from a primary operator of the business and changes its roles in providing supporting services to the private sector who is going to play a vital role in the business as shown in the following table.

Table 6.5.1 Role Sharing in Agricultural Marketing and Processing Business

No	Roles	Private Sector		Govt. /Public Sector	
		Farmers /FPOs	Enter-prises		
1	Collection and primary processing (sorting, packing, etc.) at farm level	Operation	XX	-	-
		Investment	X	-	XX

2	Commercial business operation in grading, processing, packaging, cold storage, CA storage, etc.	Operation	X	XX	-
		Investment	X	XX	-
3	Mandi operation (weighing, quality inspection, auction, temporary storage, loading and unloading)	Operation	-	XX	-
		Investment	-	X	XX
4	E-trading operation backup (system maintenance, equipment and manpower)	-	-	XX	
5	Providing market-related information (system, equipment and manpower)	-	-	XX	
6	Regulation of a quality standards system	-	-	XX	
7	Mobilising and capacity building of FPOs (farming technology and business management)	-	-	XX	
8	Matching service for FPOs and agribusiness operators (contract farming, etc.)	-	-	XX	
9	Development of public financial support system, including insurance system for FPOs/agribusiness operators	-	-	XX	
10	Linkage FPOs/agribusiness operators with financial institutions under the public financial support system	-	-	XX	
11	Business consultation to FPOs and agribusiness operators	-	-	XX	

(Note) XX:Primary role X:Subsidiary role

Source: JICA Survey Team

Public investment in agricultural marketing and processing business, especially for vegetables and fruits, shall be selectively made in accordance with a basic strategy as stipulated below.

- vi) To mobilise and incubate FPOs as a business entity.
- vii) To facilitate participation of a wide range of private enterprises in the business.
- viii) To regulate a fair and competitive agricultural marketing system.
- ix) To provide a timely and reliable market-related information to all stakeholders.

6.5.2 Principles in Planning

This component is seriously planned in accordance with the project principles as discussed below.

(1) Consistency with farmers' support program

Farmers' support component of the Project focuses on vegetable crops including spices, potatoes, etc. value chain and market development shall focus on marketing and processing of those crops. The Project, however, considers reality that a definite segmentation of target crops, such as distinguishing between vegetables and fruits, is not always a reasonable manner in terms of marketing.

(2) In line with the GOI's market reform policies

The Project shall invest in plans which will contribute to enhance the roles of public sector after understanding the principal idea of GOI's policies and the role-sharing between the public sector and the private sector.

(3) Synergistic effects between similar schemes and projects

No project in agricultural marketing and processing accomplish its objectives, only with linkage within the agricultural sector. It needs a cross-sectional linkage with other economic sectors to generate expected achievements. There are many similar schemes which have already been implemented in Himachal Pradesh, e.g., Mega Food, PM FME, SMFP, MIDH, etc. The Project shall pay a serious attention to knowledge and information obtained by the schemes for effective and efficient operation of the Project. In addition, a similar project named "Himachal Pradesh Horticulture Development Project (HPHDP)" supported by the World Bank is under implementation at present. As the Project shares a common ground with HPHDP in terms of supply-chain and agribusiness development, the Project shall pursue high synergistic benefit with HPHDP.

6.5.3 Basic Consideration to formulate the Component

Possible sub-components of value chain and market development component are outlined in accordance with four strategies discussed above.

(1) Strategy-1: To mobilise and incubate FPOs as a business entity

(a) Bringing FPOs up as a business entity

FPOs shall be mobilised and empowered as a federation of village-based farmers groups. As planned in Mega Food Park scheme, FPOs are core units in developing a cluster of agricultural marketing and processing industries. Empowerment of FPOs as an independent business entity must be the most challenging activity of the Project. As shown in the model in the following table, considerable efforts should be strategically taken for a long-time to encourage FPOs to be a self-sustaining business entity without seeking a hasty and superficial achievement. While a continuing public intervention should be well arranged in accordance with the development stages of FPOs, the intervention in the beginning stage (in the Early-Days Stage) must be crucial for incubating independent FPOs.

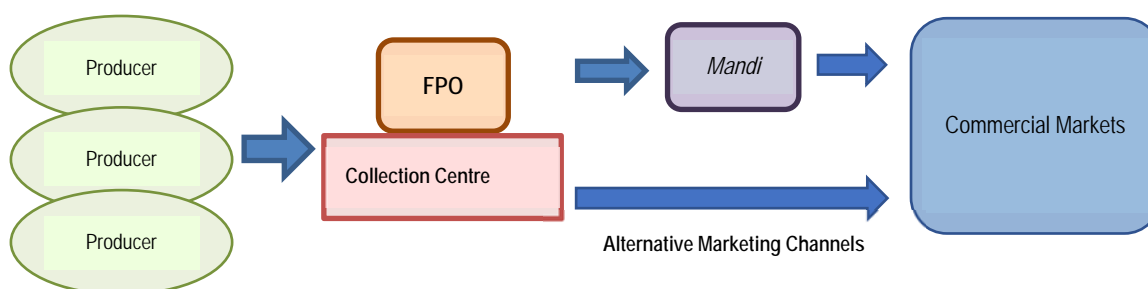
Table 6.5.2 Envisaged Development Model of FPOs

	Early-Days Stage (0 ~ 5 years)	Developing Stage (6 ~ 10 years)	Mature Stage (over 11 years)
Management Strategy	<ul style="list-style-type: none"> • To solidify the foundation for robust organisation and good management • To attain basic skills and knowledge 	<ul style="list-style-type: none"> • To deepen the attained skills and knowledge, and the management system • To expand of the organisation 	<ul style="list-style-type: none"> • To continue a self-sustaining development of the business
Business Model	<ul style="list-style-type: none"> • Collective marketing • Contract farming 	<ul style="list-style-type: none"> • Collective marketing • Collective purchasing of inputs • JV agri-business operation (marketing and processing) 	<ul style="list-style-type: none"> • Collective marketing • Collective purchasing of inputs • Independent agri-business operation (marketing and processing)
Public Intervention	Mobilisation, trainings (management and technology), information dissemination (market, new technology, supporting schemes, laws and regulations, etc.), matching with private business operators, financing, etc.		

Source: JICA Survey Team

(b) Establishment of FPOs' Collection Centre

Farmers themselves should add value to their produces if they will achieve diversification of distribution channels of agricultural produces and increased income as envisaged in GOI's policies. For arranging an opportunity to achieve these, FPOs should develop and manage a facility to aggregate and handle their produces as shown in the following figure.



Source : JICA Survey Team

Figure 6.5.1 Concept of FPOs Collection Centre

(2) Strategy-2: To facilitate participation of a wide range of private enterprises in the business

(a) Capacity building of local agribusiness operators

Local agribusiness operators are expected to play an important role in FPOs development as a business partner. As well as FPOs, the agribusiness operators need to be empowered as an independent business entity.

(b) Matching FPOs with agribusiness operators

Business models in vegetables and fruits value-chains shall be diversified and streamlined by fostering backward and forward linkage in the supply-chains through matching FPOs and agribusiness operators. A sustainable system to promote a joint business between FPOs and agribusiness operators who are interested in running a business in Himachal Pradesh should be established.

(c) Facilitation of pilot business trials

An outside investor must be a prime initiate agent to introduce and develop a new business model in the frontiers. An attempt of pilot business trial by promising agribusiness companies who are planning to run their business in Himachal Pradesh should be facilitated.

(d) Financial support to FPO and agribusiness operators

Agricultural marketing and processing business should be essentially operated and managed by the private sector including FPOs as envisaged in GOI's policies. Direct beneficiaries, i.e., private business entities themselves should make necessary investment in developing their facilities. Public financial instruments should be well-arranged to fulfil a capital requirement of the business entities.

(3) Strategy-3: To regulate a fair and competitive agricultural marketing system

(a) Modernising facilities and equipment in *mandis*

Though diversification of agricultural marketing is progressed with GOI's policies, *mandis* must remain having a leading role in supply-chains of vegetables and fruits. Even though, it is reported that many *mandis* have a problem of poor facilities and equipment in their proper operation. The facilities and equipment of selected *mandis* located at transaction hub centres should be modernised.

(b) Enhancement of eNAM trading

While 19 *mandis* in Himachal Pradesh have introduced eNAM, it is reported that they are facing a lot of challenges to enjoy smooth implementation of eNAM. The challenges should be supported with the following countermeasures:

- Improvement of communication environment (IoT equipment)
- Modification of eNAM platform system
- Staff training (operation and system maintenance)

(c) Empowerment of CAs

As private intermediators called as Commission Agents (CA) organise an auction at *mandis*, they should be empowered to facilitate a fair and competitive auction. CAs also have high potential to be a familiar business partner of FPOs at the local level. They should be constructively empowered to be an independent business entity.

(d) Setting up a workable quality standards system

Although eNAM has stated nationwide quality standards of major agricultural produces, vegetables and fruits need practical local standards as quality requirements from consumers have a wide range of diversity if location is different, if variety is different, etc. In addition, the quality is strongly influenced by weather conditions. As the conditions change every year, stated quality standards should be adjusted in accordance with the actual conditions. And the adjusted standards should be shared among all stakeholders before the harvesting season. In Japan, a workshop called "Mezoroe-kai" (means "eyes adjustment among stakeholders") is organised for that purpose every year. Staff of HPSAMB related to the quality standards should be empowered to be able to fulfil such duties.

(4) Strategy-4: To provide a timely and reliable market-related information to all stakeholders

(a) Updating *mandis*' information system

A market information system to ease the accessibility of wide range of stakeholders contributes to promote a smooth transaction in *mandis*. An improved access to reliable market information must be the most powerful tool especially for farmers to overcome their weak bargaining power due to information asymmetry. Farmers also need to increase their sensitivity to market information to manage a stable market-oriented farming for long time. *Mandis*' information system including manpower competence should be updated so that a reliable market information will be efficiently disseminated to farmers and other stakeholders.

(b) Upgrading of equipment

Mandis need to procure necessary equipment for updating the information system.

6.5.4 Project Component Planning

As described in the principles in planning, every project in agricultural marketing and processing needs a cross-sectional linkage with other economic sectors to achieve expected results. There are various government schemes and international cooperation projects, which have already been implemented in Himachal Pradesh for developing the agricultural marketing and processing industries. The project component shall be carefully planned to lead an efficient investment effect of the Project with due considerations to a good synergy with those schemes and projects.

Value chain and market development component is arranged as shown in Table 6.5.3 after examination of the project outline in above chapter with the considerations.

Table 6.5.3 Arrangement of Value Chain and Market Development Component

No	Project Components	This Project (HPCDP II)	Remarks
1	Strategy-1: To mobilise and incubate FPOs as a business entity		
1-1	Bringing FOPs up as a business entity	Yes	-
1-2	Establishment of FPO's collection centre	Yes	-
2	Strategy-2: To facilitate participation of a wide range of private enterprises in the business		
2-1	Capacity building of local agribusiness operators	No	To leverage support from the existing government schemes, e.g., SMFP
2-2	Matching FPOs with agribusiness operators	Yes	-
2-3	Facilitation of pilot business trials	Yes	To be combined with 2-2
2-4	Financial support to FPOs and agribusiness operators	No	To leverage support from the existing government schemes, e.g., National Rural Livelihood Mission, Kisan Credit Cards, MIDH, SMFP, etc.
3	Strategy -3: To regulate a fair and competitive agricultural marketing system		
3-1	Modernising facilities and equipment in <i>mandis</i>	Yes	Upgrading of 9 <i>mandis</i> is in progress by HPHDP
3-2	Enhancement of eNAM trading	No	A proposal has already given to GOI (GOI will take necessary measures)
3-3	Empowerment of CAs	Yes	-
3-4	Setting up a workable qualified standards system	No	The Agricultural Produce Marketing Standards Bureau will be established in HPSAMB (no need for additional support)
4	Strtegy-4: To provide a timely and reliable market-related information to all stakeholders		
4-1	Updating <i>mandi</i> 's information system	No	The Economic and Marketing Information and Intelligence Cell (EMI cell) will be established in HPSAMB by HPHDP (no need for additional support)
4-2	Upgrading of equipment	No	Ditto

Source : JICA Survey Team

The sub-components of Component-4 are narrowed down after the examination as shown below.

- i) Bringing FOPs up as a business entity
- ii) Establishment of FPO's collection centre
- iii) Matching FPOs with agribusiness operators and facilitation of pilot business trials
- iv) Modernising facilities and equipment in *mandis*
- v) Empowerment of CAs

6.5.5 Sub-components of Value Chain and Market Development Component

The contents of the sub-components are summarised in the following table.

Table 6.5.4 Sub-components of Value Chain and Market Development Component

No	Sub-components	Implementation Body	Inputs
1	Bringing FPOs up as a business entity	PMU (FPO Promotion Unit) assisted by PMC <Executed by> Service providers hired by PMU	< Trainings > <ul style="list-style-type: none"> • Concept of agricultural cooperative movement • Organisation management • Business management (business planning, financing, accounting, documentation and filing, computer operation and communication, etc.) • Government supporting schemes and a way of access • Agricultural marketing and market-oriented cropping • Post-harvest management of agricultural produce • Quality standards, grading and evaluation of agriculture produce • Market information system (eNAM, EMI cell of HPSAMC, etc.) • Laws and regulations related to agricultural marketing business • Study tour to advanced FPOs and private enterprises
2	Establishment of FPO's collection centre	PMU (BPMU) <Executed by> Local contractor/ suppliers	< Facility construction with equipment > Post-harvest operation hall, storage, handling tables, conveyors for grading, washing machine, pe-cooling cabinet, weighing and packing machine, office, computer set, vehicle (truck), etc. < Initial Handover Training > O&M of facilities and equipment
3	(1) Matching FPOs with agribusiness operators	PMU (FPO Promotion Unit) <Executed by> PMC	< System development and on-the-job-training > <ul style="list-style-type: none"> • Registration of potential FPOs & agribusiness operators including CAs (periodical updating) • Disseminating information on potential FPOs & agribusiness operators (periodical issue/ updating of newsletters, brochures, website, SNS, etc.) • Providing consultation services to potential FPOs & agribusiness operators to enter a joint business operation (contract farming, JV, etc.) • Organising investment fairs, matching meetings and site-visit tours • Providing intermediary services to facilitate a joint business operation between FPOs & agribusiness operators • Introducing possible government schemes supporting a joint business
	(2) Facilitation of pilot business trials	PMU (FPO Promotion Unit) <Executed by> PMC	< System development and on-the-job-training > <ul style="list-style-type: none"> • Introducing a local counterpart entity/agency for managing a pilot trial • Providing supporting services to facilitate a pilot trial (Government permission and approval process, license process, site arrangement, etc.)
4	Modernising facilities and equipment in Mandis	PMU (HASAMB) <Executed by> Local contractor/ suppliers	< Facility construction of 13 mandis (APMC) > <ul style="list-style-type: none"> • Jassor (Kangra) • Passu (Kangra) • Chauribihal (Kulu and Lahaul and Spiti) • Patlikuhal (Kulu and Lahaul and Spiti) • Khegsu (Kulu and Lahaul and Spiti) • Takoli (Mandi) • Bhattakuffar (Shimla and Kinnaur) • Tapri (Shimla and Kinnaur) • Ghandoori (Sirmaur) • Khairi (Sirmaur) • Solan (Solan) • Vahnaghat (Solan) • Kunihar (Solan)
5	Empowerment of CAs	PMU (HASAMB) <Executed by> PMC/Local experts hired by PMU	< Trainings > <ul style="list-style-type: none"> • Concept of fair trading and necessary skills of auction management • Laws and regulations related to agricultural marketing business • Quality standards, grading and evaluation of agricultural produce • Post-harvest management of agricultural produce • Sanitary management of market facility and agricultural produce • Market information system (eNAM, EMI cell of HPSAMC, etc.) • Business management (business planning, financing, accounting, documentation and filing, computer operation and communication, etc.)

Source: JICA Survey Team

(1) Bringing FOPs up as a business entity

Producers or farmers need to be empowered for the following capabilities if they will increase their income during the process in post-harvest handling and marketing.

- To maintain a stable supply of agricultural produce in terms of quantity and quality
- To increase added value of agricultural produce (sorting/grading, packaging and processing)
- To collect and process market information for making a business strategy/plan
- To operate a business (business planning, organisation management, finance and accounting)

The required roles of FPOs as a producer's organisation are not only limited in farming technology aspects but also in business management aspects to improve their bargaining power in the marketing activity. FPOs, therefore, should address many issues which are not familiar with common farmers, i.e., overcoming an information asymmetry, creating a flexible and efficient cropping cum marketing system based on market analysis, building a robust organisation structure and a sound financial base, etc. FPOs need to undergo a lot of trial-and-error processes for a certain period of time before understanding the concepts of the required roles and integrating the understanding into their daily activities.

One FPO is composed of 300 to 500 farmers who are members of KVA existing in the jurisdiction of the FPO and collection centre. The procedure for forming an FPO is assumed as follows:

Table 6.5.5 Procedure for Establishment of FPO

Step	Timeline	Procedure	Description	Executer	Supporter
Step-1	1 st year	Conduct farm management training	Each farmer provides information on his present farming and prepare the farm income target and strategy. The motivation of farmer can be confirmed.	BPMU	DPMU PMC
Step-2	1 st to 2 nd year	Conduct cultivation training and demonstration	Confirm the technical skills and real motivation of farmer.	BPMU	DPMU PMC
Step-3	End of 2 nd year	Select the candidate of member of FPO	3~5 members among motivated and skilled farmers from each subproject will be selected at the beginning based on the intention of farmers to participate in FPO	BPMU	DPMU PMC
Step-4	3 rd year	Awareness meeting	Provision of awareness meeting on benefit of formation of FPO and necessary support from the Project	DPMU	PMC
Step-5	-do-	Select initial member of FPO	Discussion among candidates for establishment of FPO	DPMU	PMU
Step-6	Bringing FOPs up as a business entity will be started				

Source: JICA Survey Team

Whilst the Project has a plan to mobilise ten FPOs in the project area, the FPOs' executives and members shall be empowered through various trainings as shown in the table. PMU will set up a special unit named "FPO Promotion Unit" dedicated for various supporting services to FPOs. The trainings shall be provided by qualified service providers hired by PMU.

In addition, the corpus fund will be launched in the project to strengthen the financial status of FPOs.

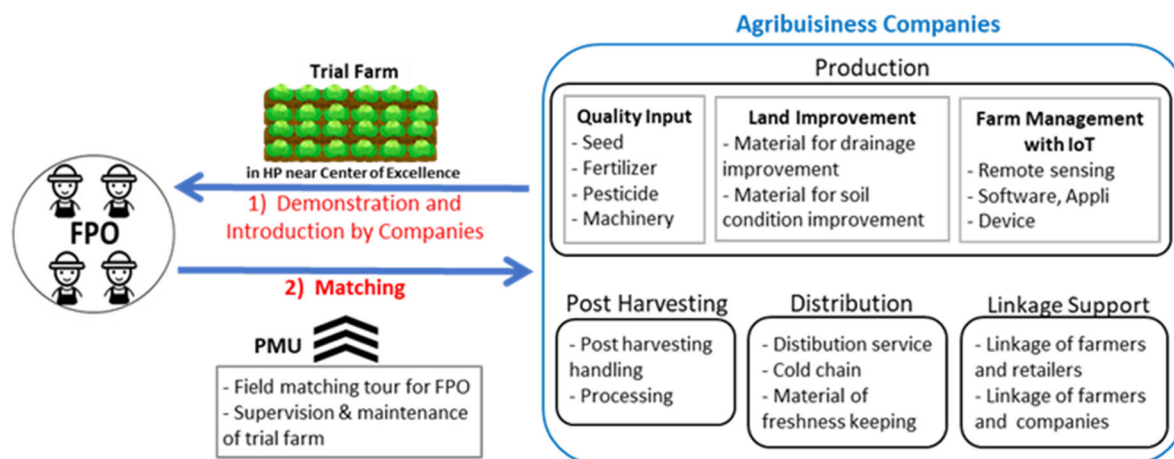
(2) Establishment of FPO's Collection Centre

The Project shall support the ten FPOs to develop a collection centre for aggregating and primary processing of harvested crops before marketing with necessary facilities and equipment. While a basic module of the facilities and equipment to be furnished are shown in Table 6.5.2, the actual components and specifications shall be determined in consultation with FPO members considering actual needs (kinds of produces, volume of aggregated produces, etc.) of each FPO.

(3) Matching FPOs with agribusiness operators and facilitation of pilot business trials

A registration system of agribusiness operators including CAs in Himachal Pradesh, the operators in the other states who are interested in running a business in the state and FPOs in the state (not limited to the ten FPOs) shall be operated by the Project in cooperation with MOFPI, DoH and DoA. The Project shall

provide various supporting services, e.g., disseminating information about agribusiness in the state, organising investment seminars, intermediating FPOs and agribusiness operators, introducing available government schemes, to the registrants in order to facilitate a joint business operation between FPOs and agribusiness operators. Also, the Project shall provide necessary services to facilitate pilot business trials to agribusiness operators. The services shall be provided by PMC in collaboration with PMU. Trainings of the FPO Promotion Unit staff of PMU shall be actively provided on an on-the-job-training basis to prepare a sustainable operation of this sub-component in the future.



Source: JICA Survey Team

Figure 6.5.2 Outline of Matching FPO with Agribusiness Operators

The list of Japanese company candidates to participate in the pilot business trial is presented below.

Table 6.5.6 Candidate Companies to Participate in Agri Business Trial

Non-disclosure information

Non-disclosure information

Source: JICA Survey Team

HPHDP has established the Agri-Business Promotion Facility (ABPF) having a function to promote agribusiness development. As ABPF has already launched several programs for supporting FPOs and agribusiness operators, i.e., investment seminars, registration of agribusiness operators and matching grants, the sub-component shall be implemented with careful considerations to a good synergy with HPHDP by sharing roles with each other.

(4) Modernising facilities and equipment in *mandis*

Thirteen *mandis* listed in the table shall be modernised by the Project. Whilst the works of the modernisation are shown in Attachment-6.5.1, the detailed design for the works shall be made in accordance with actual needs of each *mandi* after additional site surveys. PMU/HPSAMB shall manage all construction works including hiring local contractors. As HPHDP has a plan to modernise nine *mandis*, the Project shall share a common finding about the modernisation works with HPHDP.

(5) Empowerment of CAs

There are almost 1,500 CAs running a business in Himachal Pradesh. As CAs are responsible for organising a fair auction in *mandi*, which is a public market facility in India, they shall be empowered through trainings on various subjects, e.g., auction management, relevant laws and regulations, post-harvest management, market information system, business management, etc., as shown in the table. Special attention shall be paid to improve CAs' understanding about quality standards and sanitation of agricultural produces, as well as improving their financial capabilities. The trainings shall be provided by qualified local experts hired by PMU/HPSAMB under the supervision of PMC.

6.6 Institutional Development Component

6.6.1 General

Regarding the Institutional Development Component in the DPR, three activities are proposed, namely: (1) Strengthening of DoA, (2) Strengthening of Extension Service Function, and (3) Baseline Survey and Impact Assessment. As mentioned above, the contents of Institutional Development Component should be decided after considering the lessons learned in HPCDP I described in Chapter 4, keeping in mind to build a system and mechanism that can sustain the project results even after the project completion.

Strengthening of DOA is an activity mainly for efficient and smooth project management, including establishment of PMU and capacity building of staff. The Strengthening of Extension Service Function is not specific to the project, but aims to raise the level of the technology extension system of the entire

DoA. Since this project is implemented in Society Mode, it will be implemented independently of the usual government extension activities. Therefore, the necessary measures are required to smoothly transfer the project results from PMU to DoA during and after project implementation. These are the establishment of mechanism for timely sharing of information and knowledge, training for DoA staff similar to the training for PMU and so on.

6.6.2 Strengthening of DoA

This activity mainly aims to strengthen the capacity of PMU necessary for project implementation. The contents are employment and capacity building of PMU staff, procurement of necessary materials and equipment, planning and monitoring introduction of Information and Communication Technology (ICT) and Micro Irrigation System (MIS) system.

(1) Setting up PMU and Capacity Development of PMU staff

The PMU staff to be hired will be described in Chapter 7. As for the content of the training, first, sensitisation training will be conducted, and the achievement of HPCDP I and the outline of the purpose and components of HPCDP II will be explained. Especially in HPCDP II, since it is difficult to understand the connection and purpose of each activity due to the wide range of activities, the project will strive to have a common understanding among the PMU staff and other stakeholders through this sensitisation training. After that the PMU staff will be provided with knowledge of project cycle management and basic knowledge of managing the project in the PDCA cycle, and necessary technical knowledge to carry out the project. The contents of the capacity development training are as follows:

Table 6.6.1 Contents of Capacity Development Training

Types of Training	Contents	Target	Quantity	
			Unit	No.
PDCA Cycle Management	(1) Orientation workshop of PMU staff	All PMUs	time	4
	(2) Awareness on project cycle management and community participation in the planning process	All PMUs	time	3
	(3) Training of district and block Project Manager on PIM, PRA and CDP	DPMs BPMs	time	2
	(4) Conceptual training for PMU staff on PDCA cycle	All PMUs	time	3
	(5) Exposure visit of PMU staff to other states	All PMUs	time	8
	(6) Peer learning workshop	DPMUs BPMUs	time	60
	(7) Organising periodical review meeting and workshop	DPMUs BPMUs	time	50
	(8) HRD training on team building, leadership, motivation / inspiration and stress management	All PMUs	time	76
Agricultural Extension	(1) Farming practices on common and exotic vegetables with field exercises	BPMUs	time	8
	(2) Protected cultivation with field exercises	BPMUs	time	8
	(3) Integrated Pest Management	BPMUs	time	8
	(4) Integrated Nutrition Management	BPMUs	time	8
	(5) Soil analysis and soil health management	BPMUs	time	8
	(6) Market-led extension	BPMUs	time	8
	(7) Food diversification / nutrition improvement / gender mainstreaming	BPMUs	time	8
Engineering	(1) Application of the guideline and checklist	BPMUs	time	8
	(2) Data preparation and record keeping of pre-condition of each subproject	BPMUs	time	8
	(3) Design of pumping machinery	BPMUs	time	8
	(4) Collaboration with extension officers for O&M activities / gender mainstreaming	BPMUs	time	8
	(5) Organisation of design documents	BPMUs	time	8

Source: JICA Survey Team

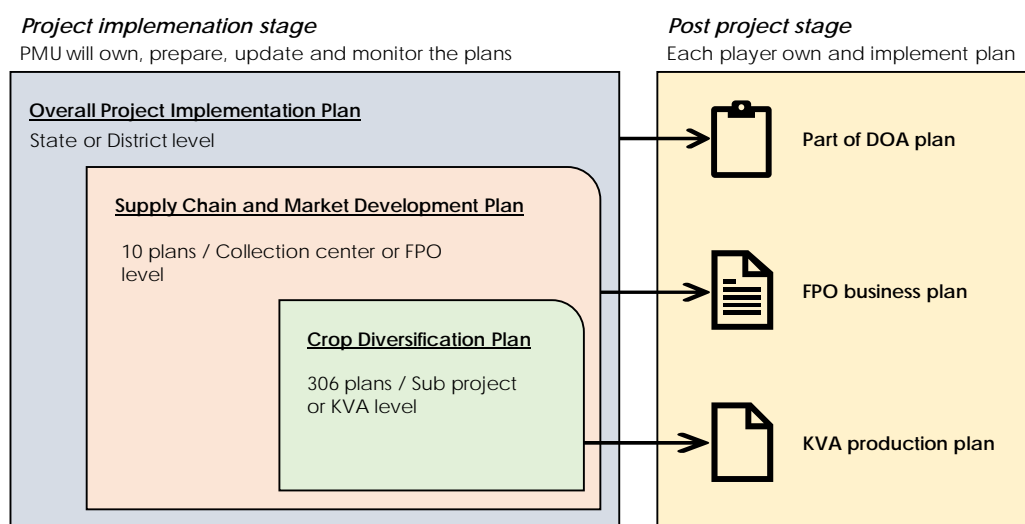
The training on gender mainstreaming targeting on the sensitization of the staff on gender issues. They will be imparted Gender training and training in Gender and Agriculture so that the importance for a gender perspective in agriculture is clearly understood. This training will be conducted annually and will be followed by a refresher. The trainings will aim at deepening the understanding of gender concepts/ gender discrimination; Gender-division of labour; Life-cycle of violence (begins from the womb to the tomb); Role of women in agriculture; Disparities between men and women in agriculture; Importance of Gender-friendly agriculture implements to ease women’s burden and drudgery; and Role of the extension officers and the extension department in supporting women farmers and poor farmers.

(2) Preparation of the Three Layer Plans and Monitoring

It is proposed to manage the various activities of the three layers with three plans, namely: (1) overall implementation plan, (2) supply chain and marketing plan, and (3) crop diversification plan. Although the three plans will be owned by PMU during the project implementation period and will be formulated and updated as necessary, after the project is completed, DoA will take over the overall plan, FPO will own the supply chain and marketing plan, and crop diversification plan will be owned and implemented by KVA. In order to sustain the project outcomes after completion of the projects, it is necessary to incorporate the activities necessary for smooth transition into the Institutional Development Component. As mentioned in Chapter 4, HPCDP I was inflexible in its activities, despite employing an implementation system of Society Mode and giving quick and independent decision-making. Therefore, in HPCDP II it will be considered to operate the activity and budget flexibly based on these three plans. The progress shall be monitored and evaluated as appropriate by the parties concerned, and the revisions shall be made at least every six months, taking into account the needs of the farmers and the surrounding conditions.

The following figure shows transition of three plans and concept of Institutional Development Component. The FPO plans to develop strategic crops, production targets and cultivation plans, and KVA plans to develop production plans accordingly. The two plans should be consistent.

In principal, the both FPO and KVA plans will be prepared in the participatory manner to involve member of FPO and farmers for decision making for raising intrinsic motivation and gives responsibility and commitment to the decided activities.



Source: JICA Survey Team

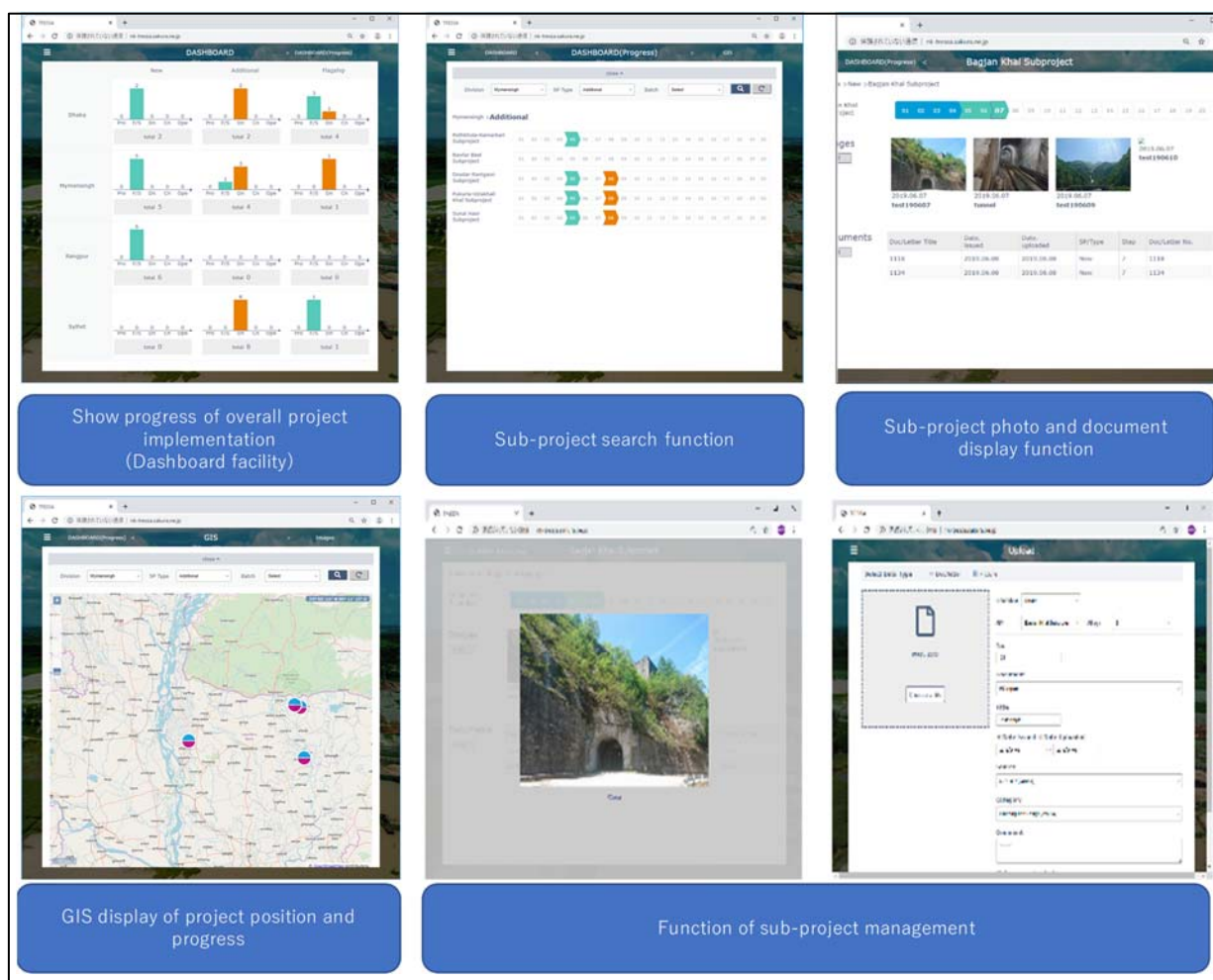
Figure 6.6.1 Plan to Control Various Activities and Concept of Institutional Development Components

At the time of preparation of overall plan, the gender policy of the project also be prepared. The preparation of a Gender Policy meant for the PMU staff to adopt and apply in the implementation of the project. This will be a concise 3-4-page document and will include a gender action plan. The gender policy will guide ideas such as: appropriate gender balance in staff recruitment, gender-desegregation of all data collected, and the setting up of the Internal complaints committee in compliance with the sexual harassment at workplace in the PMU.

(3) Establishment of MIS Monitoring System and Procurement of Necessary Equipment

This project covers 306 subprojects scattered throughout Himachal Pradesh State with many components progress in the certain procedure. In the project, it is necessary to correctly grasp the progress of activities in those subprojects, and to carry out work preparation and work follow-up at an appropriate time. In addition, it is necessary to grasp the issues that have occurred in the subproject at an early stage and take necessary measures.

From these points of view, HPCDP II will introduce the MIS system and manage the Project efficiently. The management functions required for the project are as shown in the following figure. At least (1) Show progress of overall project implementation functions (Dashboard facility), (2) Subproject search function, (3) Subproject photo and document display function, (4) Geological Information System (GIS) display of project position and progress, and (5) Function of subproject management functions are required, and systems with these functions will be developed or existing systems will be improved.



Source: Nippon Koei Co., Ltd.

Figure 6.6.2 Necessary Function of MIS for Effective Project Management

The equipment to be procured for establishment of MIS and ICT system in PMU is summarised in the following table.

Table 6.6.2 Necessary Equipment for MIS in PMUs

Category	Item	Unit	Number
Procurement of IT equipment for general use	1 PC (Laptop/Desktop)	Nos.	492
	2 Printer	Nos.	67
	3 Multi-Function Printer (MFP) Centralised Print Station	Nos.	38
	4 UPS	Nos.	124
	5 Camera	Nos.	20

	6	Projector	Nos.	20	
	7	Projector Screen	Nos.	20	
	8	Audio System	Nos.	20	
	9	Video Wall	Nos.	1	
	10	Digital Signage Board	Nos.	2	
	11	Tablet (Smart Devices)	Nos.	180	
	12	Data Storage Device (External Hard Discs)	Nos.	20	
	13	Internet (Wide Area Network)	LS	40	
	14	Internet (Wide Area Network)	LS	336	
	15	Ethernet (Local Area Network)	LS	19	
	16	PDF Software - Adobe Acrobat	Nos.	45	
	17	Documentation Software (Office)	Nos.	492	
	18	Digital Weather System	Nos.	40	
	19	Power Backup 5 KVA	Nos.	4	
	Procurement of engineering survey equipment	1	GPS (Hand Held)	Nos.	57
		2	DGPS Set	Nos.	8
		3	Total Station	Nos.	8
		4	Auto level	Nos.	16
		5	CAD Application	Nos.	14
Establishment of GIS/MIS cell (New)	1	Workstation	Nos.	1	
	3	Printer	Nos.	1	
	4	Plotter (A0 size)	Nos.	1	
	5	Scanner (A0 size)	Nos.	1	
	6	UPS	Nos.	1	
	7	Operating System	Nos.	1	
	8	Document Processing Software	Nos.	1	
	9	GIS Software	Nos.	1	
	10	PDF Software - Adobe Acrobat	Nos.	1	
	11	Data Storage Device (External Hard Discs)	Nos.	1	
	Strengthening of GIS/MIS cell (Existing)	1	Workstation	Nos.	7
2		Mobile Workstation	Nos.	2	
3		Printer Desktop	Nos.	5	
4		Plotter (A0 Size)	Nos.	3	
5		Scanner (A0 Size)	Nos.	3	
6		UPS	Nos.	7	
7		Operating System for Workstation	Nos.	9	
8		Document Processing Software	Nos.	9	
9		GIS Software	Nos.	4	
10		PDF Software - Adobe Acrobat	Nos.	7	
11		Data Storage Device (External Hard Discs)	Nos.	5	
Hiring of services for GIS survey, preparation of base spatial	1	Preparation of spatial database layers (pre intervention)	LS	Project Area	
	2	Geo-referencing of revenue maps	LS	296	
Hiring of services for development of software application	1	Development of agro-information system	LS	1	
	2	Development of application for value chain and marketing of FPOs	Nos.	1	
	3	Website	Nos.	1	
	4	Customised application for tablets	Nos.	1	
Capacity building of PMU staff on MIS/GIS, Aerial monitoring and ICT environment	1	Business process (Document creation and processing) training	LS	2	
	2	Primary data collection training	LS	2	
	3	Capacity building on survey, mapping and monitoring			
	4	Field survey using GPS/DGPS/TS/AL	LS	2	
	5	Basic GIS training	LS	2	
	6	Advanced GIS training	LS	4	

	(related to agriculture application)		
	7 Remote sensing training-basic	LS	2
	8 Remote sensing training-digital image processing	LS	2
	9 Refresher training	LS	2
Hiring of resource persons (Additional)	1 MIS & GIS Technicians	Nos.	1

Source: JICA Survey Team

(4) Construction of Training Centre under DDA

The following are the number of trainings to be carried out in the Project. In HPCDP I, an external conference room was rented as a place for discussions and training, but it took time to secure the conference room, and it was difficult to secure the conference room itself during the busy season. Therefore, it was necessary to adjust the training schedule. Based on such lessons, HPCDP II will build a conference facility in DOA as a place to conduct about half of the 2,500 trainings or consultations scheduled outside the villages shown in the table below.

Table 6.6.3 Summary of Training, Discussion, Seminar and Workshop

Types of Training		Activities	Location	Number of Trainings and Discussions	Possible Usage of DOA Training Centre ✓:Yes
Component	Sub Component				
Infrastructure	Minor irrigation scheme	Kick-off meeting on DPR preparation	Village	306	
	Rural road scheme	Ratification of DPR	Village	306	
Farmers' Support	Formation and strengthening of KVA	Awareness camp	Village	306	
		KVA formation	Village	612	
		O&M and engineering	Town	144	✓
	Vegetable promotion	Incubation of community motivator	Village	306	
			Town	418	✓
		Farm economy	Village	6,732	
		Vegetable	Village	32,192	
			Town	307	✓
		Food grain	Village	4,896	
		Next generation	Town	281	✓
		Livelihood support	Village	306	
Town	77		✓		
Nutrition	Town	24	✓		
Value Chain and Marketing	Bringing FPO as a business entity	Formation	Town	100	✓
		Training	Town	100	✓
	Empowerment of CA	Training	Town	224	✓
Institutional Development	Strengthening of DOA	Capacity development of PMU staff	Town	206	✓
		Review, preparation and monitoring of project plan	Town	100	✓
	Strengthening of extension service function	Capacity development of agricultural extension	Town	168	✓
		Capacity development of engineering staff	Town	120	✓
		Strengthening of R-E-F	Town	25	✓
		International / national seminar	Town	141	✓
	Baseline survey and impact assessment	Discussion and training	Town	9	✓

Source: JICA Survey Team

Outline of the training centre is summarised below.

Table 6.6.4 Summary of Training Centre Constructed

Particular	Description
Number of Facilities	5 nos.
Location of the Facility	Within the township of Hamirpur (two facilities), Plampur, Mandi, Solan and Shimla where DPMUs are located
Outline of Facilities	<p><u>Ground floor</u> Parking area</p> <p><u>1st floor</u> Meeting room (7.15 x 6.97 m) x 1 no. Dinning place (5.30 x 4.75 m) x 1 no. Kitchen with necessary facilities (3.67 x 1.65 m): 1 no Chwkdar Room (3.67 x 3.00 m) x 1 no. Bathroom x 2 nos. Storage () x 1 no.</p> <p><u>2nd floor</u> Training hall (12.00 x 13.00 m) x 1 no. Bathroom x 2 nos.</p> <p><u>3rd floor</u> Utility space for lodging etc x 1 no. Bathroom x 2 nos.</p>
Management	<p>The Deputy Director of Agriculture takes responsibility of the facilities under the supervision of the Director of Agriculture (DoA) in the state.</p> <p>The owner of this facility would be DoA; however, the utilisation of the facility would be done by the HPCDP II most of the time. During the project period, responsibility on the O&M of the project would be for which funds shall be raised partly by cost sharing under Partly work and partly from the Himachal Pradesh Agriculture Development Society funds.</p>

Source: JICA Survey Team

(5) Procurement of Equipment and Tools for the PMU

Procurement of equipment and tools for the PMU includes office space, furniture and vehicles required for its operations. The contents are summarised in the table below.

Table 6.6.5 Procurement of Equipment and Tools for the PMU

Items	Amount	Remarks
Rented accommodation for office space for District PMU	168 months	2 DPMUs, 7 years
Rented accommodation for office space for Block PMU	840 months	10 BPMUs, 7 years
Furniture and office equipment, (New PMUs)	7 locations	Required furniture for staff in new PMUs
Replacement/ updating of furniture	12 locations	Additional furniture for existing PMUs
Transport facilities at PMU (multi-utility vehicles and sedan or equivalent), procurement of new vehicles and motorcycles, hiring up of vehicles including operational cost.	L.S.	Procurement of 3 vehicles (SPMU 3) and hiring of 24 MUVs (SPMU,DPMU 08, BPMU 14), 40 motorcycles
Publicity events, public awareness materials, inaugural ceremonies of subprojects	L.S.	
Hiring of support services	192 man-month	4 key experts*192 MM on intermittent basis
Project operational expenses	L.S	

Source: JICA Survey Team

6.6.3 Strengthening of Extension Service Function

This activity is mainly aimed at strengthening the capacity and dissemination function of DoA staff. Activities include preparation of information, education and communication (IEC) materials for dissemination, capacity development of agricultural extension staff, capacity development of engineering staff, strengthening of research- extension-farmer linkages and joint visits, overseas training,

exposure / study includes visits of project staff and other stakeholders, upgrade of infrastructure of state agriculture management and extension training institute (SAMETI). These are activities that contribute to the sustainability of project results.

(1) Preparation of Information, Education and Communication (IEC) Materials for Dissemination

In order to disseminate the experience of the project to DoA, village and other stakeholders, the IEC materials will be prepared. The contents of the IEC are posters, wall writings, street plays, handouts and manuals, video programs, and farmers' fair. The number of activities is shown in the following table.

Table 6.6.6 Outline of Information, Education and Communication

Contents	Number of Activities Implemented	
	Unit	Number
(1) Posters	Site	306
(2) Wall writings and fixing of posters	Site	306
(3) Street plays on present situation and improvement	times	306
(4) Publication of handouts and manuals	Sum	-
(5) Preparation of video programs	Nos.	16
(6) Display of shows	Site	306
(7) Farmers' fair in each cluster	Cluster	10
(8) Dissemination of technologies through demonstration	times	1,184

Source: JICA Survey Team

(2) Capacity Development of DOA Staff

The contents of the capacity development training are as follows:

Table 6.6.7 Contents of the Capacity Development Training of DoA Staff

Types of Training	Contents	Target	Quantity	
			Unit	No.
Agricultural Extension	(1) Farming practices on common and exotic vegetables with field exercises	Extension staff in DDA & SMS office	time	24
	(2) Protected cultivation with field exercises	-do-	time	24
	(3) Integrated Pest Management	-do-	time	24
	(4) Integrated Nutrition Management	-do-	time	24
	(5) Soil analysis and soil health management	-do-	time	24
	(6) Market-led extension	-do-	time	24
	(7) Food diversification/nutrition improvement/gender mainstreaming	-do-	time	24
Engineering	(1) Application of the guideline and checklist	Engineering staff in DDA	time	24
	(2) Data preparation and record keeping of pre-condition of each subproject	-do-	time	24
	(3) Design of pumping machinery	-do-	time	24
	(4) Collaboration with extension officers for O&M activities / gender mainstreaming	-do-	time	24
	(5) Organisation of design documents	-do-	time	24

Source: JICA Survey Team

(3) Strengthening of Research- Extension-Farmer Linkages and Joint Visits

The Project conducts workshop and seminar for strengthening of researchers, extension officers and farmer linkage and conducts field trial to establish FPO-based extension system. Under this category of work, establishment of FPO based extension system as an experiment will be carried out.

The work load of DoA extension workers is heavy, and there is a concern about the sustainability of the project outcomes. Therefore, during the implementation of this project, a trial and verification program

will be conducted to reduce the workload of DoA extension workers. Specifically, it is a trial of a new dissemination system using the FPO organisation, and aims to establish the new system in the DoA after the project is completed.

The implementation procedure is summarised in the table below.

Table 6.6.8 Implementation Procedure for Trial on FPO-based Extension System

Procedure	Description	Executor	Supporter
STEP-1 Interview survey	Conduct interview survey with extension officers in DOA to collect actual work load of the extension workers	PMC	-
STEP-2 Conduct workshop for preparation of trial plan	DOA and PMU staff will participate in the workshop. The PMC facilitate the discussion among the participants to decide the trial plan with clear milestones	PMC	-
STEP-3 Drafting new extension system regulation	New extension system regulation, which specify the role of extension office and office bearer of FPO in agricultural extension. The drafted regulation will be discussed among PMU, DOA and other stakeholders in SAU. The regulation should estimate the reduction of the workload if new extension will be implemented.	DOA	PMU PMC
STEP-4 Nomination of candidate FPO, extension officers in DDA and BPMU	Nomination of candidate FPO, extension officers in DDA and BPMU for trial. The clear timeline and responsibility and necessary action will be agreed in the written document.	DOA PMU	PMC
STEP-5 1 st trial for new extension system	Conduct 1 crop season trial	DOA PMU	PMC
STEP-6 Review meeting	Compile the result of trial and make necessary modification on the trial plan	DOA PMU	PMC
STEP-7 2 nd trial for new extension system	Conduct 1 crop season trial	DOA PMU	PMC
STEP-8 Review meeting	Compile the result of trial and make necessary modification on drafting new extension system regulation Maintain the FPO as a model case	DOA PMU	PMC
STEP-9 Disseminate the experience	Through ICE activities the success model will be disseminated to all the site offices in DOA	DOA	PMC

Source: JICA Survey Team

(4) International / National Seminars and Workshops

International and national seminars and workshops will be conducted to share the experience and lesson learned of the Project with stakeholders in and out of the state. Through such seminars, similar operations will inspire one another and discussions will contribute to efficient project management.

The agenda, expected participants, and timing of seminar and workshop are summarised as follows:

Table 6.6.9 Summary of International / National Seminar and Workshop

Contents	Main Agenda	Expected Participants	Timing
(1) Seminar / National Workshop	<ul style="list-style-type: none"> • Presentation on the progress and output of the Project by PMU • Presentation on farmers' experience under the Project by KVAs • Presentation on vegetable production by a local university • Presentation on project activities by Indian agricultural projects • Presentation on products and activities by private companies 	<ul style="list-style-type: none"> • Officers of PMU • Officers of DoA and local departments • Officers of JICA India and Japan • Representatives of KVAs • Representative of local university • Representatives of agricultural projects in India 	Twice before the Project completion

Contents	Main Agenda	Expected Participants	Timing
		<ul style="list-style-type: none"> Representatives of private companies 	
(2) International Workshop	<ul style="list-style-type: none"> Presentation on progress and output of the Project by PMU Presentation on farmers' experience under the Project by KVAs Presentation on vegetable production by local university Presentation on project activities by Indian agricultural projects Presentation on project activities by Indian and other South Asian countries' agricultural projects Presentation on products and activities by private companies 	<ul style="list-style-type: none"> Officers of PMU Officers of DoA and local departments Officers of JICA India, South Asian countries and Japan Representatives of KVAs Representative of local university Representatives of agricultural projects in India Representatives of agricultural projects in South Asian countries Representatives of private companies 	Once before the Project completion
(3) State Level Seminar / Workshop	<ul style="list-style-type: none"> Presentation on progress and output of the Project by PMU Presentation on farmers' experience under the Project by KVAs Presentation on vegetable production by local university Presentation and demonstration by local private companies 	<ul style="list-style-type: none"> Officers of PMU Officers of DoA Officers of JICA India Representatives of KVAs Representative of local university Representatives of local private companies 	16 times during the Project

Source: JICA Survey Team

(5) Overseas' Training

The overseas training will also be organised to see the advanced extension system and technologies. Since JICA has some of the training courses on SHEP and nutrition improvement, the training will be tied-up with those programs and be implemented.

Moreover, one overseas training in Japan will be organized for observation on agricultural supply-chain system, techniques and agribusiness companies of Japan (refer Attachment 6.6.1), which was planned to be conducted in this Survey but was not able to be conducted due to COVID-19.

The outline of overseas trainings is given in the following table.

Table 6.6.10 Outline of Overseas Trainings

Main Topics		Destination	Participants	Number of Participants
JICA Initiative	<ul style="list-style-type: none"> SHEP approach Nutrition improvement 	Japan	<ul style="list-style-type: none"> Officers of PMU Officers of DoA 	8 to 10 each
Overseas training in Japan	<ul style="list-style-type: none"> Japanese agricultural techniques of agricultural supply-chain Discussion with Japanese agribusiness companies on application of their techniques to HP 	Japan	<ul style="list-style-type: none"> Officers of PMU Officers of DOA Members of FPO 	8 to 10 each
Production and primary processing	<ul style="list-style-type: none"> Basic and advanced cultivation skills Post-harvest handling and processing skills Good Agricultural Practice (GAP) Irrigation management 	Selected from Japan, Netherland, Israel, etc.	<ul style="list-style-type: none"> Extension officers of DPMU and BPMU Extension officers of DDA Representative of KVAs 	8 to 10 each
Extension and agricultural marketing and value addition	<ul style="list-style-type: none"> Extension services of government and private sectors Agricultural cooperative system Value addition and market-in agriculture Empowerment of agricultural entrepreneur 	Selected from Japan, Netherland, Israel, etc.	<ul style="list-style-type: none"> Officers of PMU Officers of DoA 	8 to 10 each

Source: JICA Survey Team

(6) Upgrading of Infrastructure of State Agriculture Management and Extension Training Institute (SAMETI) (under preparation)

SAMETI has a role as an institution responsible for strengthening the extension capacity of Himachal Pradesh State, and is conducting capacity building training for extension workers of the Department of Agriculture. Training for extension workers may take several days, but at present, there is no accommodation, so participants from other districts may use private accommodation or have limited government accommodation. Under HPCDP II, nearly 2,500 training sessions, seminars and discussions are planned and the participants coming from other districts must stay at least two days (before and after) in the area where the training and seminar are taking place. It is therefore necessary that the lodging facilities will be built in the premises of SAMETI to improve the convenience of training participants. The contents of upgrading of infrastructure of SAMETI are summarised below.

Table 6.6.11 Summary of Upgrading of SAMETI

Particular	Description
Location of the Facility	Craignano Mashobra at a distance of 15 km from Shimla
Outline of Building	Four stories building Flooring area of 800 m ² Number of beds: 10 nos. with attached bathroom Area of rooms: 3.75 x 5.00 m = 18.75 m ² per room Other facilities: Two kitchens with necessary equipment (5.83 x 7.00 m per kitchen) Two dining halls with two tables (5.83 x 5.00 m)
Management	Director of SAMETI will be responsible of the management One clerk, two caretakers, one cook with two gate keepers and one pion will be employed by SAMETI and manage the facilities

Source: JICA Survey Team

6.6.4 Baseline Survey and Impact Assessment

The Baseline Survey and Impact Assessment is part of the PDCA activities that is normally required to carry out a project. It is expected to capacitate DoA staff in the project cycle management skills through implementation of baseline survey and evaluation activities.

The contents of baseline survey and impact assessment are as follows:

Table 6.6.12 Outline of Baseline Survey and Impact Assessment

Type of Survey	Contents	Remarks
Baseline survey	Household survey in approximately 30 sites (10% of 306 candidate subproject sites in the short list), samples in each site would depend upon the number of households in each subproject	• Survey to be carried out by resource agency, supervised by District PMU at each site, under overall coordination of State PMU with technical and managerial support by project consultant for ToR preparation, selection of survey contractors, field execution, analysis and evaluation, report preparation, dissemination. Through the process of these activities, the capacity of PMU and DoA staff will be strengthened.
Mid-line survey	Household survey in 13 sites (10% of implemented sites), 20 samples in each site (260 samples) Community-based Impact Assessment (CBIA) for capturing indicators of change in 13 sites (10% of implemented sites)	• Survey to be carried out by resource agency, supervised by District PMU at each site, under overall coordination of State PMU. Through the process of these activities, the capacity of PMU and DoA staff will be strengthened.
End-line survey	Household survey in 8 sites (5% of implemented sites), 20 samples in each site (160 samples) Community-based Impact Assessment (CBIA) for capturing indicators of change in 16 sites (10% of implemented sites)	• Survey to be carried out by resource agency, supervised by District PMU at each site, under overall coordination of State PMU. Through the process of these activities, the capacity of PMU and DoA staff will be strengthened.

Source: JICA Survey Team

In the mid term and end line survey time, the gender perspective in the project implementation will also be evaluated based on gender policy prepared by PMU. Then This is targeted at the PMUs and will require nominating a gender officer to assess/evaluate the gender perspective that has been developed during the project implementation. The key objective being to assess, to what extent has the project been gender sensitive in its implementation and facilitated the process among the beneficiaries. It will help to ensure that the project's objective of gender mainstreaming is being realised through gender perspective in implementation and the specific criteria laid out being adhered to as articulated in the proposed gender policy.

Chapter 7 Implementation Plan

7.1 General

This chapter describes the implementation plan of the Project, which consists of the project organisational structure, implementation schedule, procurement plan, quality control, contract management and safety management for the construction works.

7.2 Overall Project Organisational Structure

7.2.1 Department of Agriculture (DoA)

The Department of Agriculture (DoA) is the nodal agency for the Himachal Pradesh Crop Diversification Promotion (HPCDP). It shall work as a channel between the Executive Committee and the Project Management Unit (PMU) in respect to all necessary communication, correspondence and related matters regarding the Project in relation to communication/ note/ report, etc., sent and received by the PMU. Whereas in some aspects like reimbursement claims and routine budget forecast, the PMU shall communicate directly with the Japan International Cooperation Agency (JICA).

7.2.2 Governing Council

The PMU works under the overall supervision and guidance of the Governing Council formed by the Government of Himachal Pradesh (GoHP). The Governing Council is presided by the Minister of Agriculture, GoHP; and the Principal Secretary, Agriculture, GoHP is the Vice-President of the Council. The Project Director of the PMU is the member secretary. The other members of the Governing Council are:

- i) Principal Secretary Finance, GoHP
- ii) Advisor Planning, GoHP
- iii) Director of Agriculture, GoHP
- iv) Managing Director, Himachal Pradesh State Agricultural Marketing Board
- v) Vice Chancellor, Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya (CSKHPKV), Palampur
- vi) Representative of the Ministry of Agriculture, Department of Agriculture & Cooperation Government of India
- vii) Chief Project Advisor

In addition, there are three non-official members having experience/exposure in agriculture nominated by GoHP.

7.2.3 Executive Committee

The affairs of the PMU are administered by an Executive Committee under the Governing Council. The Executive Committee is responsible for overall administration, monitoring, technical quality control and formulating guidelines for operation and function of the PMU. The Executive Committee is chaired by the Principal Secretary, Agriculture, GoHP. The Project Director of the PMU is the member secretary. The other members of the Executive Committee are:

- i) Principal Secretary Finance, GoHP
- ii) Advisor Planning, GoHP
- iii) Director of Agriculture, GoHP
- iv) Managing Director, Himachal Pradesh State Agricultural Marketing Board
- v) Three District Project Managers of District Level PMU Offices
- vi) Chief Project Advisor

The specific responsibilities of the Executive Committee will be:

- i) Review and approve annual plan of operation and budgetary allocations;

- ii) Provide overall guidance and supervision for administrative and financial management of the Project;
- iii) Study the monitoring reports on project progress and initiate steps, as may be necessary, to rectify or remedy any defect or deficiencies identified in these reports; and
- iv) Report to the Governing Council on the progress and issues, if any, with regard to the implementation of the Project as well as submit the annual plan of operation and budget for consideration and approval.

7.2.4 Finance Committee

In addition to the Executive Committee, there is a Finance Committee, which shall oversee and guide all matters relating to financial sanction. The Finance Committee shall consist of the following:

- i) Principal Secretary/ Secretary Agriculture, Government of Himachal Pradesh: Chairperson
- ii) Principal Secretary (Finance), Government of Himachal Pradesh: Member
- iii) Director of Agriculture, Government of Himachal Pradesh: Member
- iv) Project Director, PMU: Member Secretary

The specific responsibilities of the Executive Committee will be:

- i) Full power to accord financial sanctions for the purchase of various inputs, goods, equipment, services, etc., required for execution of project works.
- ii) Full powers for financial sanction for infrastructure viz. buildings, access roads, irrigation schemes, collection centres or any other infrastructure.
- iii) Full power to accord financial sanction for all other expenditure required for implementing the project/ development activities.

7.2.5 Project Management Unit (PMU)

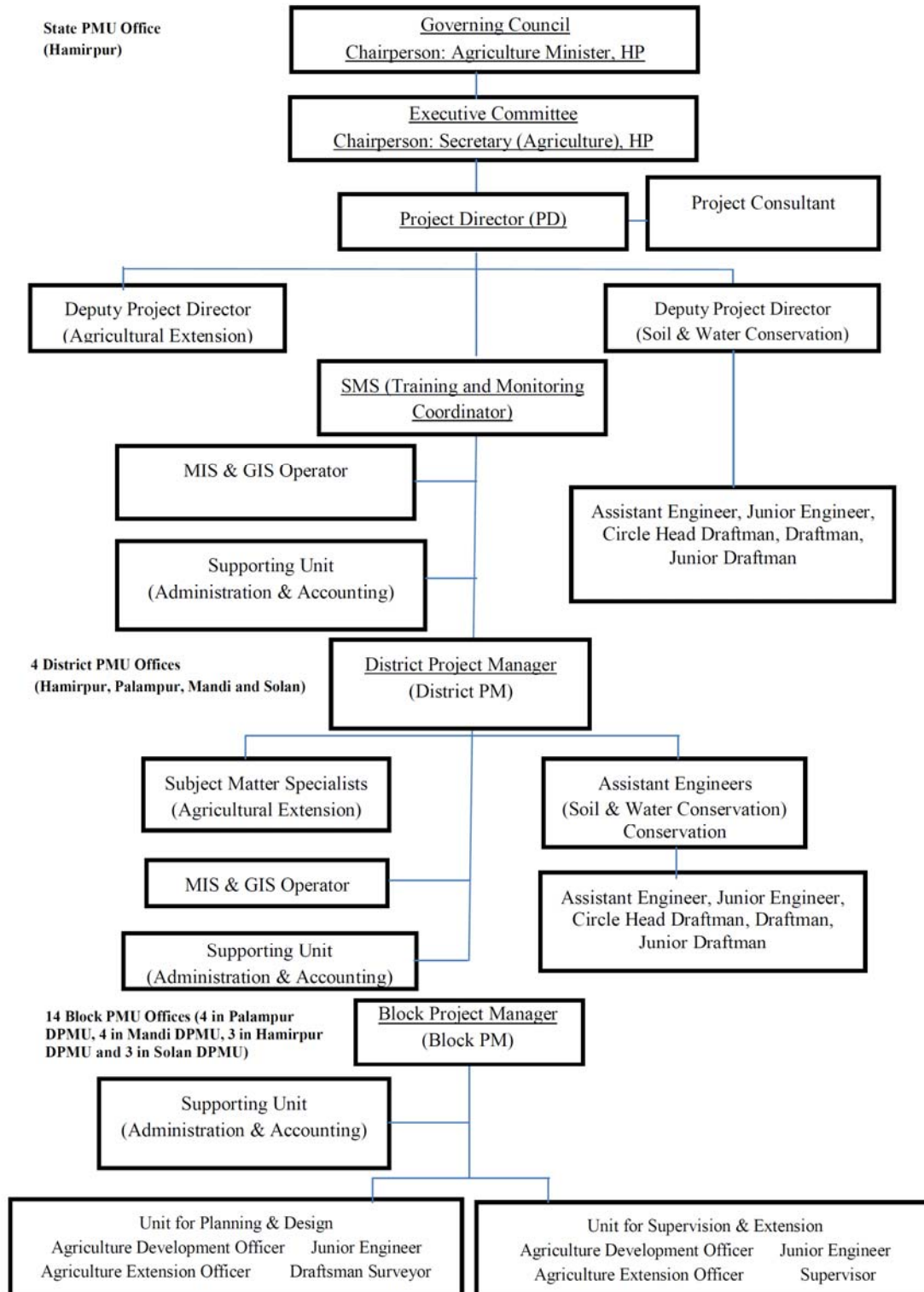
(1) State Level PMU (SPMU)

The State PMU Office, which is the Central Office of the PMU, is situated in Hamirpur, District Hamirpur, Himachal Pradesh. The State PMU Office is responsible for the overall management of HPCDP. District Level PMU (DPMU)

There are four District PMU Offices: (i) District PMU Office in Hamirpur District covering three districts, namely: Hamirpur, Bilaspur, and Una; (ii) District PMU Office in Palampur District covering two districts, namely: Kangra and Chamba; (iii) District PMU Office in Mandi District covering three districts, namely: Mandi, Gohar, Kullu and Sarkaghat; and (iv) District PMU Office in Solan District covering four districts, namely: Sirmaur, Solan, Shimla, and Kinnaur. The District PMU Offices are responsible for management of district level activities of HPCDP II in their respective district jurisdictions.

(2) Block Level PMU (BPMU)

There are 14 Block PMU Offices: (i) one each in Hamirpur, Bilaspur and Una; (ii) four in Mandi, namely: Mandi, Gohar, Kullu and Sarkaghat; (iii) four in Palampur, namely: Palampur, Dehra, Dharamshala and Chamba; and (iv) three in Solan, namely: Solan, Nahan and Rampur. The Block PMU Offices are responsible for supervision of field level activities of HPCDP and providing technical advice in their respective district jurisdictions. The organisational structure of the PMU and jurisdiction of each are provided as follows:



Source: JICA Survey Team

Figure 7.2.1 Jurisdiction of Each PMU Office



Source: JICA Survey Team

Figure 7.2.2 Jurisdiction of Each PMU Office

(3) Staffing and Responsibility

The PMU is staffed by officials deputed from the DoA, GoHP, and hiring of qualified and experienced personnel will come from an external agency on a contractual basis. The selection of the external agency is done through open local competitive bidding. The staffing pattern of PMU is given in Attachment-7.2.1

7.2.6 Project Management Consultant (PMC)

To reinforce the implementation capacity of the PMU as well as to ensure technical assistance and quality control of the Project, a team of consultants will be procured by the PMU and will be referred to as Project Management Consultant (PMC). The PMC will assist the PMU in the improvement of processes and procedures for project implementation at the state, district and block levels.

The scope of work of the PMC will be determined by the PMU in consultation with JICA. A sample Terms of Reference for the PMC is provided in Attachment-7.2.2.

7.2.7 Mechanism of Inter Departmental Coordination and Knowledge Share

HPCDPP (II) holds a monthly information exchange meeting for knowledge sharing for the purpose of sharing information and experiences of PMU and DoA. Since the Delhi Development Authority (DDA) office holds a monthly progress monitoring meeting for each government project, DPMU staff will also participate in the meeting and exchange information with participant. In addition, SPMU will take the initiative for conducting project coordination meeting on a quarterly basis among the relevant organisations such as Himachal Pradesh State Agricultural Marketing Board (HPSAMB), Department of Horticulture (DoH), Department of Fishery (DoF), Department of Animal Husbandry (DoAH), etc.

7.3 Types of Procurement Method

Procurement by the PMU for HPCDP can be classified into: (a) construction works, (b) supply of materials or goods, which also include durable items such as office furniture, survey, design equipment and consumables such as stationeries, etc., and (c) hiring of services including consultancy. Prior to procuring construction works, goods or services, specifications, plan, drawing, design,

special requirement or other description pertaining thereto shall be prepared by the PMU. The description referred to shall be based on international standards, where such exist; otherwise, on national technical regulations, recognised national standards or codes.

The technical specifications shall be prepared on the basis of relevant objectives, technical and quality characteristics, and wherever appropriate, in terms of performance rather than design or descriptive characteristics. In preparing the description, unless there exists any other way of mentioning clearly in an intelligible manner the characteristics of the construction works or goods or services, a particular brand, trademark, name, patent, design, type, origin or producer's name shall not be mentioned. If there is no other way than such mentioning, a particular brand, trademark, name, patent, design, type, origin or producer's name shall be mentioned subject to the approval of the Technical Committee to be formed by the Project Director.

The PMU shall prepare description of procurement requirements in conformity with applicable environmental protection legislation. For the purpose of opening tenders or proposals and evaluation of bids, the PMU shall constitute a tender committee comprising a minimum of three members.

Procurement of construction works or goods or services can be made either through (a) international competitive bidding or (b) national (or local) competitive bidding.

International Competitive Bidding shall be for contracts above INR 15 crores and shall be in accordance with the provision of Sections 1.02 and 1.03 of Part I of the Guidelines for Procurement under Japanese official development assistance (ODA) loan. National (or local) competitive bidding shall be for contracts up to INR 15 crores, and for which international bidding is not required in accordance with the agreement with JICA.

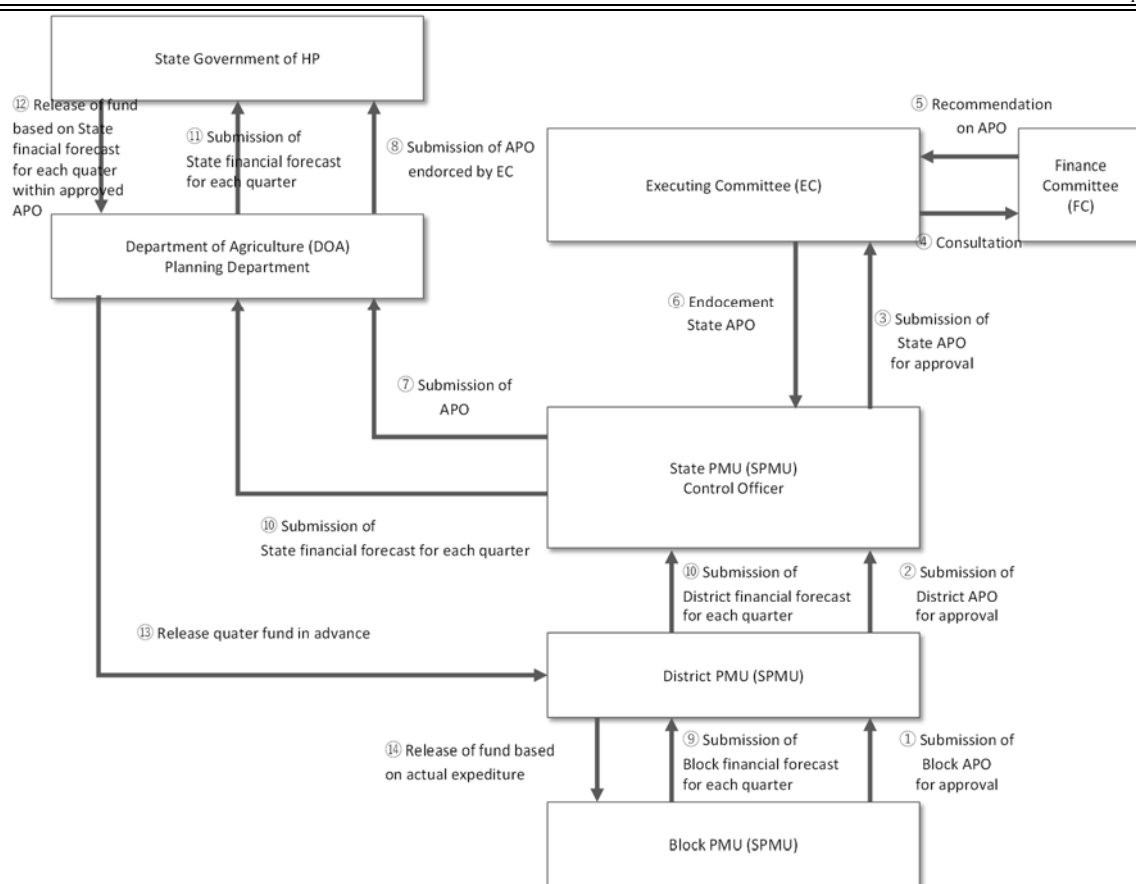
7.4 Overall Fund Flow

7.4.1 Budgeting

The financial year of the PMU shall be from 1st April of the year to 31st March of the next year. First of all, estimated receipts shall be worked out. For this, the DPMU and BPMU shall be asked to indicate their estimated funds that will remain unspent through their respective controlling officers. The SPMU shall also work out the funds that would remain unspent. Such unspent amount will come under the category "unspent balance of the current year". The balance in the bank account of the SPMU and DPMU shall be worked out. This will come under the category of "funds available in bank account". Requirement of funds for the project works in the next financial year has to be decided by the PMU by the end of January along with the estimated expenditure. The budget prepared by the PMU shall be placed before the Executive Committee during January for its review and approval. The PMU shall, at the end of each quarter, review the progress of works done, funds position and take appropriate action.

7.4.2 Release of Funds

The SPMU shall send the draft annual plan of operation for the succeeding year to the DPMU. In consultation with the BPMUs, the DPMUs shall take steps to work out their work plan with financial forecast for each quarter and send the same to the SPMU. The SPMU, on receipt of the proposals, shall scrutinise and consolidate them along with their own office requirements. It shall then be send to the DoA/ Planning Department, GoHP, in the form of Annual Plan of Operation. The PMU shall release funds directly to the DPMUs based on the approved annual work plan and quarterly financial forecast.



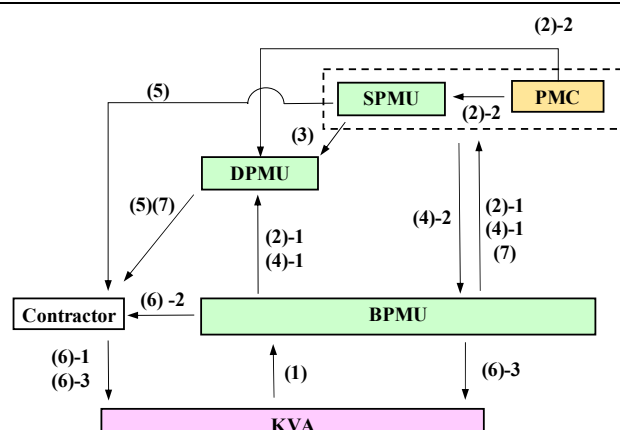
Source: JICA Survey Team

Figure 7.4.1 Overall Fund Flow

7.5 Implementation Plan of Infrastructure Development Component

(1) Construction of Minor Irrigation, Farm Access Road and Catchment Area Treatment Component

The preparation of application from Krishak Vikas Association (KVA), preparation of Minimum Project Report by PMU and selection of subprojects have already been completed by DoA and PMU of the HPCDP I by the time when the preparatory survey commenced in July 2020. After starting of the Project, PMU prepares a Detailed Project Report (hereinafter “DPR”) of each subproject and offer tender through e-tendering system after the approval of the DPR by PMC. Construction work will be supervised by BPMU engineering staff and they will control the quality of works of the contractor using the “Quality Assurance & Control Manual”, which will be prepared by PMC. Since tendering will be offered based on a subproject wise, the number of packages will be 306.



Source: JICA Survey Team

Figure 7.5.1 Implementing Procedure of Minor Irrigation, Farm Access Road and Catchment Area Treatment Component

Table 7.5.1 Procedure and Executor

No .	< Paper Procedures >		Required Period	Executor	Assisted By	Remarks
(1)	Application Form	Preparation	1 month	Farmers		Already done
		Approval		BPMU of HPCDP I/ SDSCO		Already done
(2)	Minimum Project Report (MPR)	Preparation	1 month	BPMU of HPCDP II/ SDSCO		Already done
		Evaluation		SPMU of HPCDP I		Already done
(3)	Selection of Subproject			SPMU of HPCDP I		Already done
(4)	Detailed Project Report (DPR)	Preparation	3 months	BPMU	PMC	Survey/ Design
		Approval	2 months	SPMU	PMC	
(5)	Tender	Notice Inviting Tender	1 month	DPMU		E-tendering
		Evaluation	1 month	DPMU (less than INR 75 lahks)	PMC	
		Issue of Award Letter	1 month	SMPU (more than INR 75 lahks)		Work Order
(6)	Construction	Construction	9 months	Contractor		Dry Season
		Supervision	-	BPMU/ DPMU	PMC	
		Completion Certificate	-	BMPU/ Contractor/ KVA	DPMU/ PMC	
(7)	Project Completion Report (PCR)	Preparation	2 months	BPMU		
		Approval		SPMU	PMC	

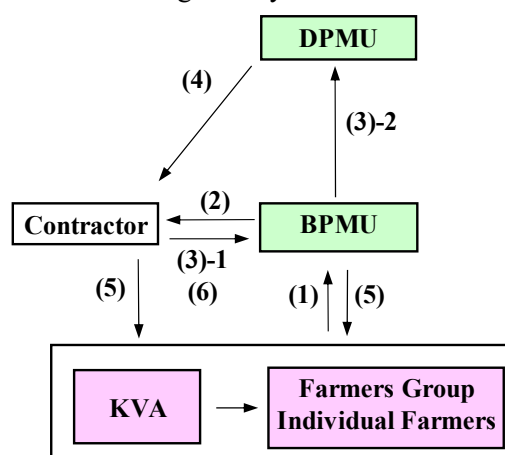
Note : 1. Award Letter (Work Order): Items, Rate, Total Amount, Construction Deadline, etc., are included, 2. In MPR, CCA, location, farming families, willingness of farmers, cropping pattern, verify the source of water were confirmed. 3. Defects of minor irrigation facilities, farm access road, and catchment area treatment are warranted by contractor for 6 months. 4. Pre-qualifications (P/Q) are not carried out.

Source: JICA Survey Team

(2) Provision of Micro Irrigation System and Solar Fencing

In case of provision of micro irrigation system and solar fencing, BPMU selects an empanelled service provider in DoA and the service provider conducts field survey, identifies needed materials to be installed to correspond with the field condition and prepares cost estimate. After approval of those documents by DPMU, DPMU will issue an award letter to the service provider for implementation. The service provider has the responsibility of installing the micro irrigation system and solar fencing. This procedure is summarised as follows:

From the experience of HPCDP I, PMC had better monitor the supervision of installation of micro irrigation system since the extension officer does not have an engineering background and sometimes it is hard to judge whether or not micro irrigation system has been installed properly.



Source: JICA Survey Team

Figure 7.5.2 Implementing Procedure of Provision of Micro Irrigation System and Solar Fencing

Table 7.5.2 Procedure and Executor

No.	< Paper Procedures >		Required Period	Executor	Assisted By	Remarks
(1)	Application Form	Preparation	1 month	KVA	-	Farmers who apply MIS are selected by KVA
		Approval		BPMU	-	
(2)	Selection of Service Provider	-	2 weeks	BPMU	-	
(3)	Design and Cost Estimation	Preparation	1 month	Service Provider	-	Estimate, Plan, Feasibility Report, Agreement between Farmers and Service Provider
		Approval		DPMU	-	
(4)	Award Letter (Work Order)	-	2 weeks	DPMU	-	
(5)	Installation	Installation	1 month	Service Provider	PMC	
		Supervision		BPMU	PMC	
		Completion Certificate		BMPU/ Service Provider/ KVA, Farmer		
(6)	Preparation	2 months		Service Provider		
	Approval			DPMU		

Source: JICA Survey Team

(3) Quality Control

The Consultant will assist the Engineer (PMU) in the quality control of construction works. In the detailed design and construction supervision, the priority shall be placed on quality control in construction of the project facilities, particularly in the following:

- i) Intake structure: Location of intake facilities shall be carefully selected considering the situation in the dry season.
- ii) Motor Pump: To select appropriate motor power and type of pump.
- iii) Rising Main: Alignment shall be designed and constructed as the number of bent points is on the minimum as possible as they can.
- iv) Concreting: Proper mixing (weight base) and strict curing work.

- v) Earthwork: Selection of adequate soils and proper compaction with certain specifications.
- vi) Structures: Analysis of works by equipment on compaction works and concrete mixing at the site.

At the initial stage, the Consultant will assist PMU in the preparation of the Quality Control Manual (QC Manual) containing the standard operation procedure (SOP) for quality control, the construction drawing preparation manner, the quality control method/ procedures, the procedure of the works, the various formats for the quality control test, the daily inspection check format, the dimension control format, and so on. Since the Project will implement many packages at once, it is proposed to organise the quality control guidance to have the same perception on quality control and to standardise its operation, namely, same standard, same procedure, same manner, same format and same perception. In order to keep the high performance of quality control, it is recommended to hold the said quality control guidance at the pre-construction meeting of each contract during the construction works period.

Taking the above into account, the quality control of the contractors' work in general is mentioned below:

1) Setting Out and Survey Reference Controls

Before starting the construction works, the Consultant will assist the Engineer (PMU) in checking all (temporary local) benchmarks for vertical and horizontal controls, inclusive of additional benchmarks, which will be established by the contractors for the convenience of construction. Further checking of the accuracy of all contractors' stakeouts is important. Any deviations or inaccuracies which may be noted in the surveying works will be settled between the Engineer and the contractors with assistance of the Consultant.

2) Site Inspections

The Consultant will assist the Engineer (PMU) in carrying out site inspections of the works in order to ensure quality of the works performed by the contractors in accordance with the technical specifications and sound engineering practices. The Engineer, with support from the Consultant if necessary, will give the instructions or orders to the contractors whenever necessary, or in case of foreseeable troubles or events.

The Consultant will assist the Engineer in making the judgment of acceptance or rejection of any part or parts of the completed works in accordance with the technical specifications, drawings and testing results.

3) Field and Laboratory Tests

In the course of construction works, various kinds of tests will be performed at the fields and in laboratories. The tests for quality control will be elaborated in the technical specifications of the contract documents. The Consultant will assist the Engineer (PMU) in reviewing the test items and recommend modification/improvement, if necessary. The tests for concrete works to be made to ensure proper quality of the works are explained below.

The Consultant will assist the Engineer in providing instructions to the contractors to carry out field tests and laboratory tests for concrete works. Before executing concrete works, laboratory tests will have to be conducted to determine the mix proportion of the respective types of concrete and to confirm the quality of materials to be mixed into concrete. These tests will be executed by contractors in accordance with the authorised standards specified in the contracts.

(4) Contract Management

The contract management is the process of managing contract creation, execution and analysis to maximise operational and financial performance of an organisation, while reducing financial risk. The contract management is broadly divided into three periods as shown in the figure below.

Pre-Contract Period	Construction Period	Defects Notification Period
Issue of the Tender Documents Submission of the Tender Signing of the Contract Agreement	Commencement Date Test on Completion Issue of Taking-Over Certificate	 Issue of Performance Certificate

Source: JICA Survey Team

Figure 7.5.3 Typical Sequence of Principal Events during Contract

The following table summarises the contractual claims, which have been submitted by the contractors in the past Japanese ODA projects. To implement the Project smoothly in accordance with the implementation schedule, it needs to organise construction supervision teams including a capable and experienced contract management expert in addition to the technical and management support by PMU.

Table 7.5.3 Major Claims During Contract Period (Samples)

Major Cause of Claims	Description
1) Delay in tendering (Pre-contract period)	It requires adjustment of unit prices and price escalation in case of a lengthy delay in tendering or repeated tendering due to the reasons at the Employer side.
2) Lack of possession of site (Construction period)	Land acquisition of construction sites is a major cause of claim by the contractor. The Employer shall acquire the lands necessary for the construction works at least before the commencement of works.
3) Delayed drawings (Construction period)	The Engineer must issue construction drawings for site setting-out by the contractor and approve the contractor's working drawings within the specified time. The delayed drawings are subject to claim by the contractor.
4) Delayed payments (Construction period)	There are several reasons for delayed payments, for instances, time-taking for confirmation of work volume by the Engineer, delay in issuing the payment certificate by the Employer.
5) Unforeseeable ground conditions (Construction period)	It often happens that the actual foundation (geology) of dams and structures differ from the design. It will bring about variation and subsequently claimed for extension of time by the contractor.
6) Variation (Construction period)	Variation orders for design are often issued by the Engineer due to unforeseeable ground conditions, wrong information of benchmarks (coordinates and elevation), changes of construction methods and materials, etc. It usually needs a time to negotiate for new unit prices.
7) Force majeure (Construction period)	It is principally identified as being an "exceptional" event or circumstance, beyond the party's control, and something that it could not have reasonably provided against before entering into the contract; for example, wars, rebellion, terrorism, civil war, riots, earthquakes, typhoons, volcanic activities and also the COVID-19 pandemic.
8) Extension of time (Construction period)	The above causes (2 to 7) are subject to extension of time for construction. It is often associated with cost increase. The Engineer shall make fair and square evaluation based on the Contract when claimed by the contractor.

Source: JICA Survey Team

The Engineer (PMU) is responsible for the contract management under the Project. The Consultant will assist the Engineer in contract management, if requested.

(5) Safety Management for the Construction Works

The safety management aims to establish a safe and health-conscious working environment in order to achieve the goal of "ensuring human safety". Special measures for COVID-19 shall be considered in accordance to the government rules and guidelines. The establishment of such environment should minimise the negative impact on the environment and/or society of the countries and consequently improve efficiency and productivity. The Engineer (Project Implementation Unit) is responsible for

the safety management under the Project. The Consultant will assist the Engineer in safety management, if requested.

(6) Operation and Maintenance (O&M) of Infrastructure Development

1) Warranty Period

Contractor and service provider have responsibilities of their work in the time of below warranty period.

Table 7.5.4 Warranty Period of the Works

No.	Item	Description	Responsibility	Warranty Period
1.	Civil Works of Minor Irrigation System	Water harvest structure, water distribution tank, pipeline, outlet, etc.	Contractor	6 months
2.	Machinery and Electric Devices of Minor Irrigation System	Pumping machinery, motor, electrical board, etc.	Service Provider	1 year
3	Micro Irrigation Systems	Sprinkler system, drip system, storage tanks, etc.	Service Provider	5 years
4	Catchment Area Treatment	Wire crates, silt retention structure	Contractor	6 months
5	Solar Electrical System	Panels and other items	Service Provider	5 years
6	Access Farm Road	Road	Contractor	6 months
7	Solar Fence	Solar panel, fence, etc.	Service Provider	2 years

Source: JICA Survey Team

2) Owner and O&M Responsible of Each Component

In-charge of O&M shown in the below table shall operate and maintain (routine maintenance, periodic maintenance) the infrastructure which they have responsibilities. The owner, such as DoA, will continue to provide technical support after the project and conduct emergency maintenance such as repair of water harvest structure and damage repair due to natural disasters.

Table 7.5.5 Owner and O&M Responsibility and Regular Activities

No.	Item	Owner	O&M Responsibility	Activities Done by O&M Responsibility
1)	Minor Irrigation (LIS, STW)	DOA/ KVA	KVA	<ul style="list-style-type: none"> ▪ Awareness-building among farmers on judicious water use. ▪ Water distribution: distribution and determination of water tariff and collection. ▪ Collect irrigation charges from the farmers on an hourly basis besides fixed monthly contribution by each member of KVA. ▪ Maintenance of accounts. ▪ Payment of energy charges and replacement. ▪ Maintenance such as supervision actions intended to retain an item in, or restore it to, a state in which it can perform the required function. ▪ Grievance redressal of farmer members especially on sharing and use of water.
	Minor Irrigation (FIS)	KVA	KVA	
2)	Micro Irrigation System	KVA	KVA	Build awareness among farmers and provide trainings for the proper usage of system, flushing, etc.
3)	Catchment Area Treatment	DOA	DOA	Repair of wire crate structure if there are some damages.
4)	Solar Pump	DOA/ KVA	KVA	Regular maintenance of solar panels, tracking system, electric parts and removal of bushes/ trees around and above the panels.
5)	Farm Access Road	KVA	KVA	Removal of gravels/ pebbles from the farm road, proper drainage and refilling of pot holes, if any.
6)	Solar Fencing	DOA/ KVA/ Farmers	KVA/ Farmer	Regular inspection of electric units, wires, clearance of grass and bushes below the wires.

Source: JICA Study Team

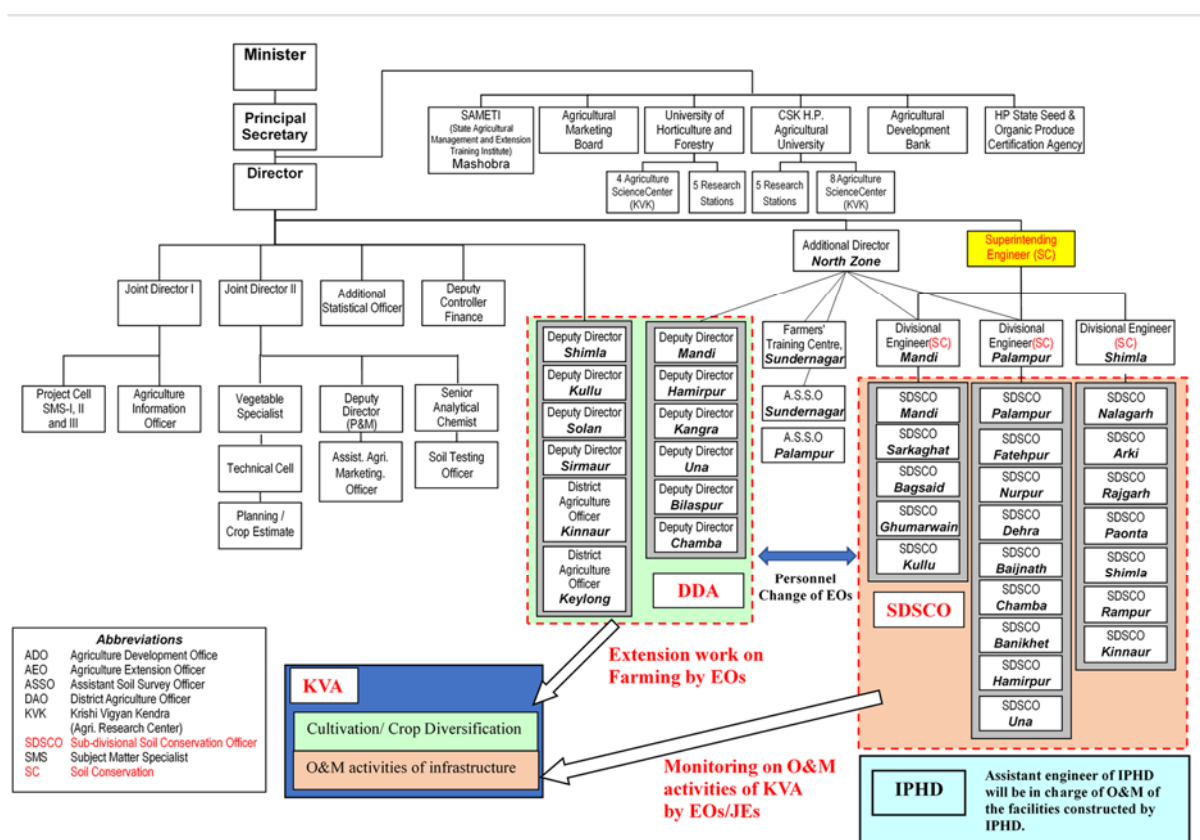
After the preparation of DPR, construction work will be carried out. Before the completion of the construction work, the capacity development training on O&M of irrigation and other infrastructure will be carried out by the BPMU. In the training, KVA will develop an O&M plan for infrastructure facilities. After the transfer of the facility, KVA will start to maintain the facility according to the O&M plan formulated. BPMU will give the necessary follow up training and advise throughout the project period.

The contents of O&M training are given below.

- i) Conduct workshop to discuss principles and practices of irrigation and water management.
- ii) Conduct training on water use planning for equitable water distribution.
- iii) Conduct field training on basic engineering skills with reference to land levelling, water courses, field channels, etc.
- iv) Conduct training to MC members (officer bearers) on participatory management processes including leadership, communication and conflict resolution.
- v) Conduct training on accounting principles and practices, such as accounts, bookkeeping, financial audit and financial disclosures.
- vi) Training on credit management.

3) Structure of Monitoring of O&M Activities by DoA

The Superintending Engineer will be the overall in-charge of the state for the O&M of infrastructure development activities. Deputy Director of Agriculture (DDA) and Sub-divisional Soil Conservation Officer (SDSCOs) will monitor the activities and extension officers and junior engineer of SDSCO will play a main role in monitoring of KVA's O&M activities of infrastructure. However, since personnel change of extension officers between DDA and SDSCO is carried out, all extension officers can be in-charge of KVA's O&M activities. The organisation structure including superintending engineer is shown below.



Source: JICA Survey Team

Figure 7.5.4 Structure of Monitoring of O&M Activities by DoA

7.6 Implementing Organisation for Other Components

7.6.1 Farmers' Support Component

As described in Chapter 6, farmers' support component includes formation and strengthening of KVA, vegetable promotion, research and development (R&D) support with strengthening of State Agriculture University (SUA), innovative activity, livelihood support activity and nutrition improvement. The implementing organisation of those components is shown in the following figure.

Formation and strengthening KVA will be carried out by BPMU agricultural extension officers. The awareness campaign to be implemented at the beginning of the activity will be conducted on village basis and the training will be conducted to KVA. The teaching materials used for the training will be prepared by DPMU with the support of PMC, and DPMU staff will carry out Training of Trainers (TOT) to the person in-charge of BPMU based on the material.

Regarding vegetable promotion activities, BPMU will directly conduct trainings and field demonstrations. However, in case of the staff's on-site operation exceeds three days a week, the work will be outsourced to KVK and State Agriculture Universities (SAU). In addition, by using Farmers' Producer Organisation (FPO) to arrange training, distribution of materials and selection of beneficiaries, workload of BPMU extension workers can be reduced for efficient implementation.

Regarding the provision of agricultural machinery and materials, BPMU will contract with the supplier for procurement and the supplier also implements the installation and O&M guidance. The next generation program will also be outsourced to a local non-governmental organisation (NGO) and BPMU will control the work quality.

Regarding R&D Support and SAU seed field maintenance, funds will be provided to SAU based on the created DPR, SAU will carry out the project, and SPMU will manage the results.

For activities related to innovative activity, DPMU contracts with local suppliers and contractors to construct and install the facility.

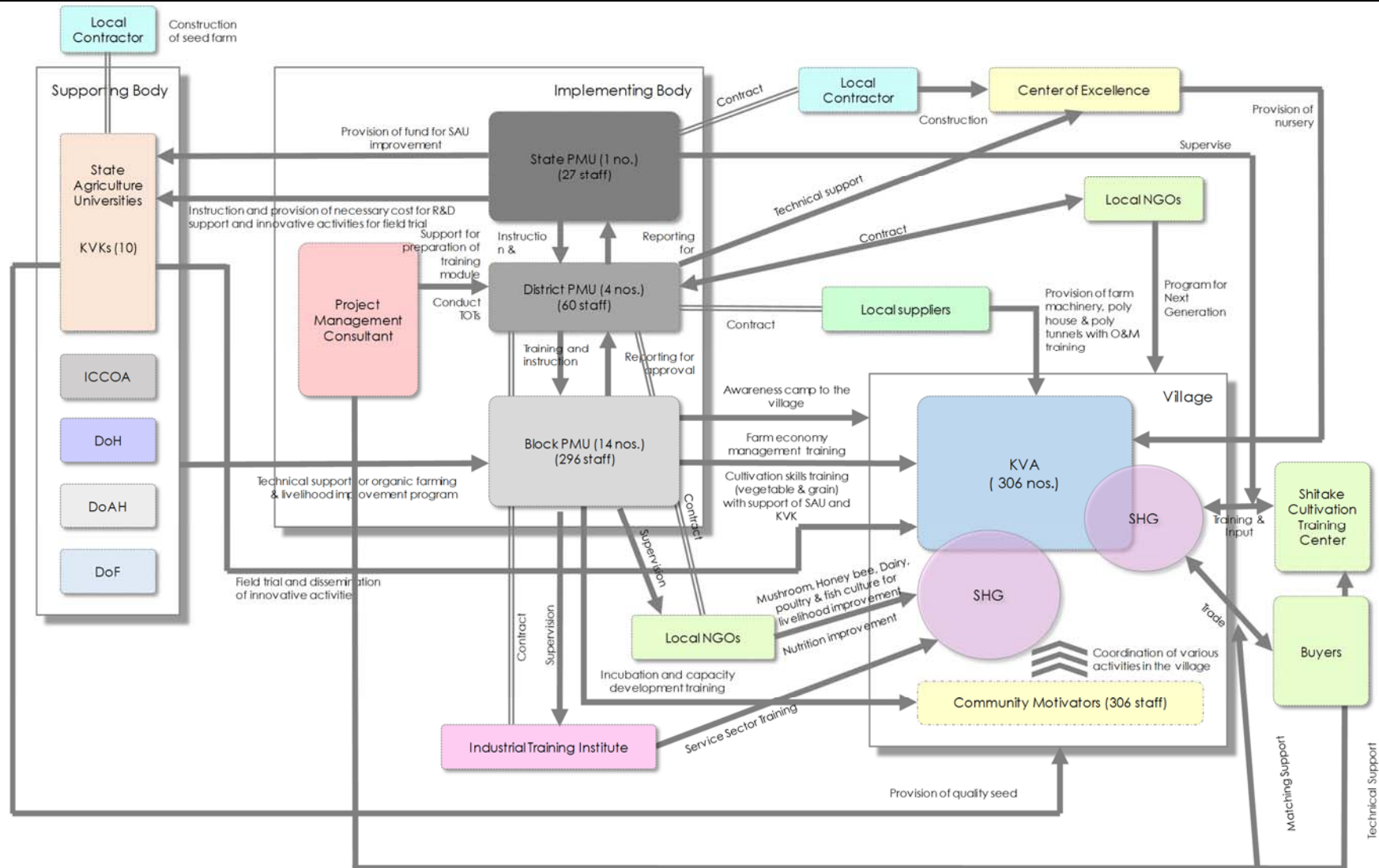
Livelihood improvement and nutrition activities will be carried out by BPMU for Self Help Group (SHG) identification and capacity building, and specific livelihood improvement activities will be outsourced to local NGOs. In addition, related departments such as DoH, DoF, and DoAH will provide technical advice regarding activities as appropriate and PMC will provide technical guidance support to Shitake Cultivation Training Center (SCTC) for the shiitake mushroom business.

7.6.2 Implementing Organisation of Value Chain and Market Development Component

Activities that will make FPO as an economic entity will be entrusted to National Bank for Agriculture and Rural Development (NABARD), Small Farmers Business Consortium (SFAC) or other qualified service providers, which have a track record of launching and supporting FPO. PMC provides technical advice on how to proceed the incubation of FPO with training material. The construction of collection centre will be carried out by the local contractor based on DPR created by PMC. BPMU engineers will supervise the construction work. The facilities required for collection centre will be procured through local supplier based on the contract with DPMU.

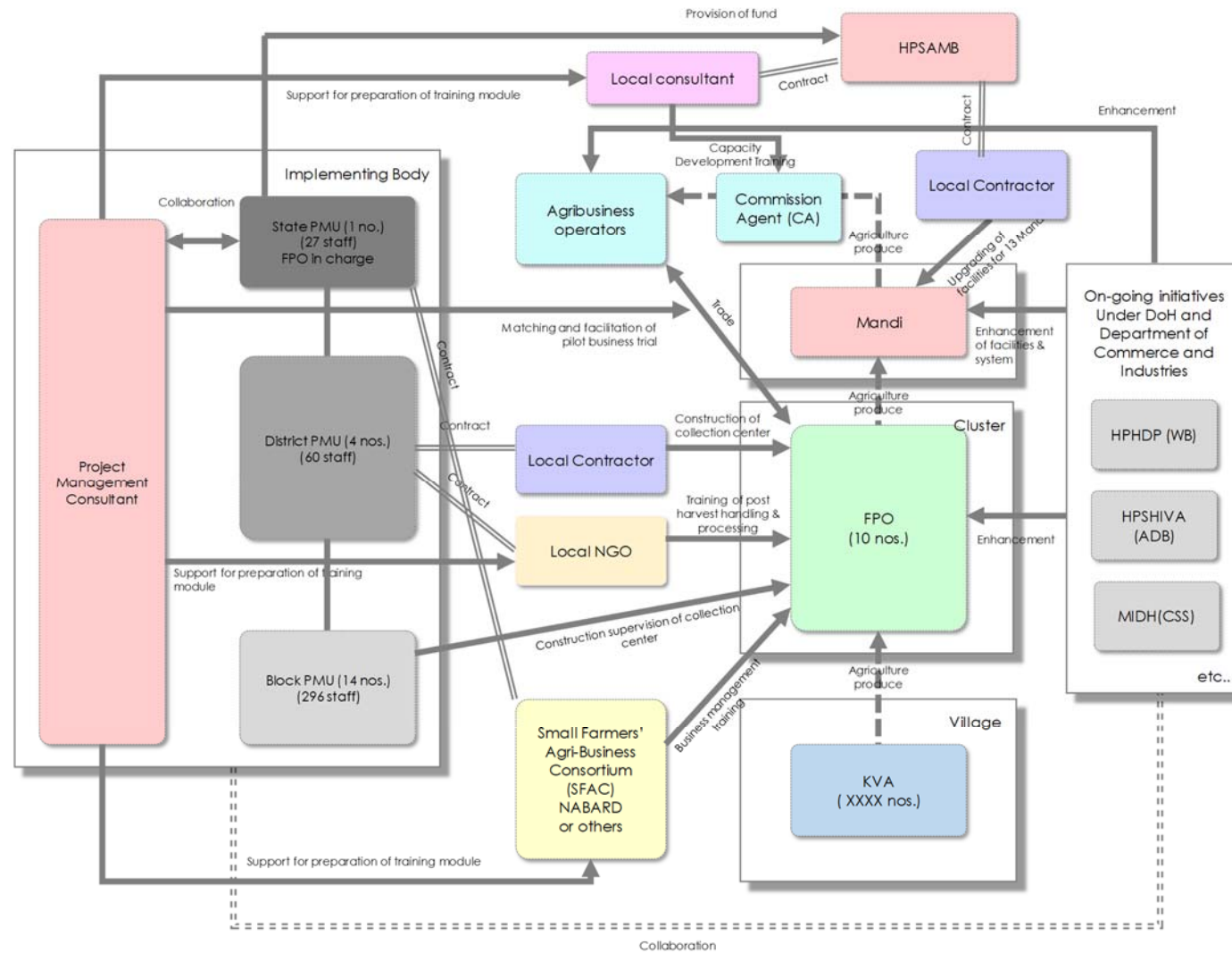
Matching with private companies and pilot business trials will be conducted by FPO personnel in SPMU and supported by PMU. Since the pilot business trial will be conducted at the Centre of Excellence established in the project, the KVK and SAU will also be involved in the activities. Activities to renovate the market will be entrusted to HPSAMB with the necessary funds after SPMU approves the DPR created by HPSAMB. HPSAMB will use these funds to perform renovation work in accordance with DPR. The construction will be carried out by a local contractor and HPSAMB engineer or hired engineer will supervise the construction work. The PMC will provide technical assistance as needed.

Capacity development training on commission agent will also be entrusted to HPSAMB as well after SPMU approves the DPR created by HPSAMB. HPSAMB employs local consultants (such as National Bank for Agriculture and Rural Development Consultancy Services (NABCONS)) who are familiar with marketing and crop distribution and sales systems. PMU assist in the preparation or improvement of training materials. The organisational chart for value chain and market development component is shown below.



Source: JICA Survey Team

Figure 7.6.1 Implementing Organisation of Farmers' Support Component



Source: JICA Survey Team

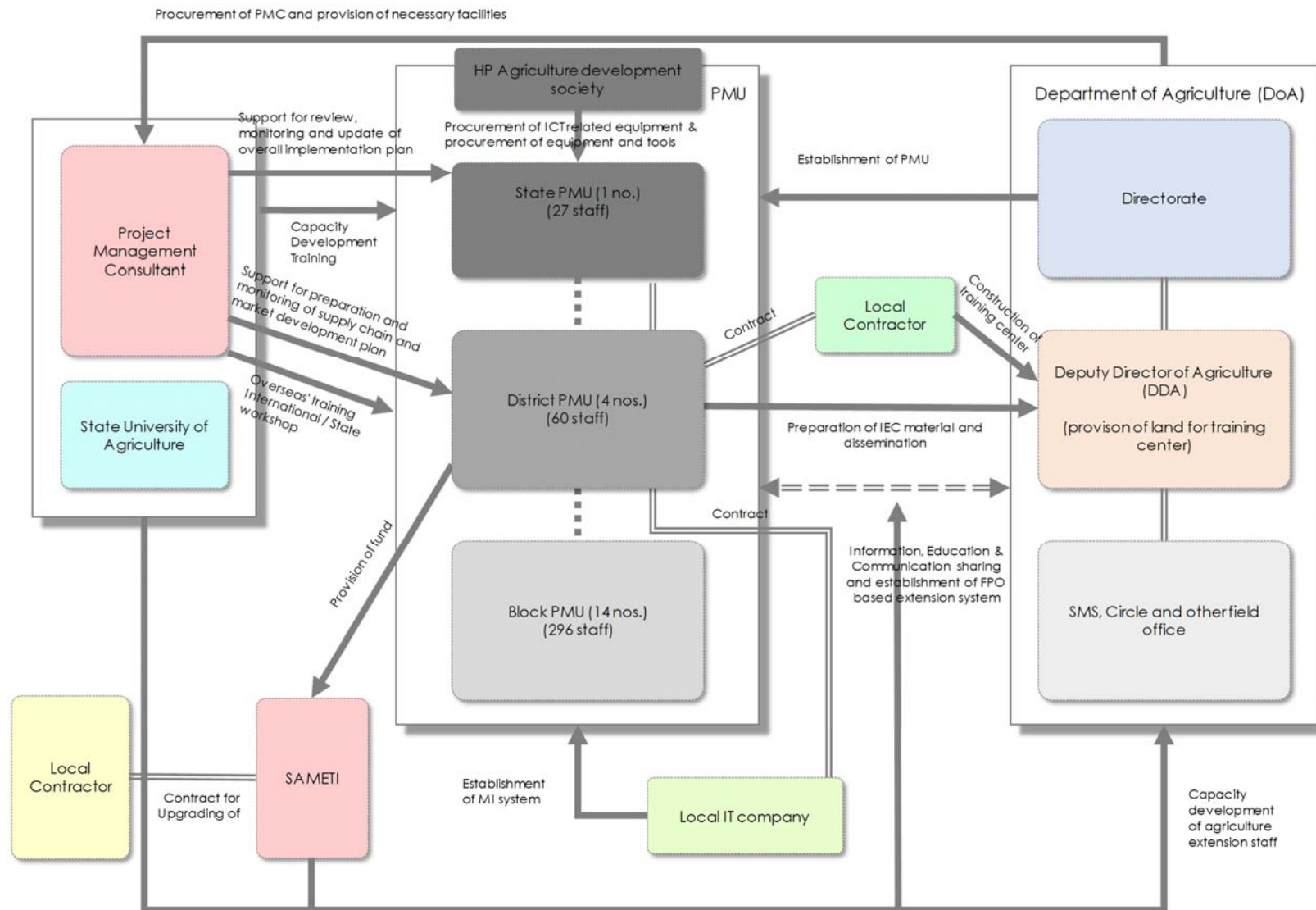
Figure 7.6.2 Implementing Organisation of Value Chain and Market Development Component

7.6.3 Implementing Organisation of Institutional Development Component

The Institutional Development component includes strengthening PMU implementation capacity, strengthening DoA extension capacity and baseline surveys and project evaluations. The Himachal Pradesh Agriculture Development Society will launch the PMU, and the PMC, in collaboration with SAU, will provide capacity development training to PMU. The PMU will carry out the planning and monitoring of the overall implementation plan, supply chain plan market development plan and crop diversification plan, and the PMC will assist them. In addition, a local information technology (IT) company will build a project management system using information and communications technology (ICT) and management information system (MIS) under the advice of PMC. In addition, the materials and equipment required for the establishment of the project management system will be procured from local suppliers. Regarding the construction of State Agricultural Management and Extension Training Institute (SAMETI's) training facility, SPMU will provide SAMETI with the necessary funds for the construction cost after the SPMU approves the DPR created by SAMETI. SAMETI contracts with a local contractor to carry out the necessary construction. The practice of Information, Education and Communication aimed at collaboration with PMU, DoA and related stakeholder will be carried out in collaboration with DPMU and DDA, and PMC will support as appropriate. Training on agricultural technology dissemination and engineering for DoA staff will be conducted by PMC with the cooperation of SAU. PMU and PMC will jointly carry out a trial for building an FPO-based extension system. Seminars and overseas training will be conducted by PMC. Regarding the strengthening of DDA training facilities, funding will be provided to DoA based on the DPR approved by SPMU, and DoA will conclude a contract with a local contractor and construct it.

Baseline surveys and project evaluations will be conducted by PMU and supported by PMC.

The organisational chart for institutional development component is shown as below.



Source: JICA Survey Team

Figure 7.6.3 Implementing Organisation of Institutional Development Component

7.7 Procurement Method

The procurement method of the four components is summarised in the following tables.

Table 7.7.1 Procurement Method for Each Activity (1/4)

Particulars of Activity			Procurement Method	Target Group	Initiated by	Executed by	Assisted by
1. Infrastructure Development Component							
1.1 Infrastructure Development for sub-projects							
1.1.1.	Minor Irrigation	DPR preparation	DU	KVA	DPMU	BPMU	PMC
		Pre construction activities	DU	KVA	DPMU	BPMU	PMC
		Construction	LCB	KVA	DPMU	Local contractor	BPMU / PMC
1.1.2	Micro Irrigation Schemes	DPR preparation	DU	KVA	DPMU	BPMU	PMC
		Pre construction activities	DU	KVA	DPMU	BPMU	PMC
		Procurement	LCB	KVA	DPMU	Local supplier	BPMU / PMC
1.1.3	Catchment area treatment	DPR preparation	DU	KVA	DPMU	BPMU	PMC
		Pre construction activities	DU	KVA	DPMU	BPMU	PMC
		Construction	LCB	KVA	DPMU	Local contractor	BPMU / PMC
1.1.4	Provision of Solar powered pumping machinery for lift irrigation and STW	DPR preparation	DU	KVA	DPMU	BPMU	PMC
		Pre construction activities	DU	KVA	DPMU	BPMU	PMC
		Construction / procurement	LCB	KVA	DPMU	Local contractor Local supplier	BPMU / PMC
1.1.5	Farm access roads	DPR preparation	DU	KVA	DPMU	BPMU	PMC
		Pre construction activities	DU	KVA	DPMU	BPMU	PMC
		Construction	LCB	KVA	DPMU	Local contractor	BPMU / PMC
1.1.6	Solar/ electric fencing for protection of vegetables on cost sharing	DPR preparation	DU	KVA	DPMU	BPMU	PMC
		Pre construction activities	DU	KVA	DPMU	BPMU	PMC
		Procurement		KVA	DPMU	Local supplier	BPMU / PMC
1.2 Crop Diversification through Convergence in created irrigation potential of Irrigation Schemes of IPH/DOA							
1.2.1	Improvement of existing Irrigation schemes for distribution system	DPR preparation	DU	KVA	DPMU	BPMU	I&PHD / PMC
		Pre construction activities	DU	KVA	DPMU	BPMU	I&PHD / PMC
		Construction	LCB	KVA	DPMU	Local contractor	I&PHD / PMC
1.2.2	Micro Irrigation Schemes	DPR preparation	DU	KVA	DPMU	BPMU	I&PHD / PMC
		Pre construction activities	DU	KVA	DPMU	BPMU	I&PHD / PMC
		Procurement	LCB	KVA	DPMU	Local supplier	I&PHD / PMC
1.3 Infrastructure development support							
1.3.1	Miscellaneous of above works (Infrastructure development support)		DU	KVA	DPMU	BPMU	-
2. Farmers Support Component (Including 10 sub-projects of Convergence Irrigation Schemes of IPH/DOA)							
2.1 Formation and Strengthening KVA							
2.1.1	Awareness Camp involving Community		DU	Community	DPMU	BPMU	TCP
2.1.2	Formation and formalization of KVAs		DU	KVAs	DPMU	BPMU	TCP / PMC
2.1.3	Capacity development of KVAs for O&M Management		DU	KVAs	DPMU	BPMU	PMC
2.2 Vegetable Promotion							
2.2.1	Incubation and capacity development of community motivators		DU	Community	DPMU	BPMU	TCP / PMC

Source : JICA Survey Team

Table 7.7.2 Procurement Method for Each Activity (2/4)

Particulars of Activity		Procurement Method	Target Group	Initiated by	Executed by	Assisted by	
2.2.2	Farm Economy Management, Training on farm management by farm type (advanced, intermediate and conservative)	DU	KVA	DPMU	BPMU	University / KVK / PMC	
2.2.3	Training cum method demonstration on Cultivation Practice of vegetable crops	DU	KVA	DPMU	BPMU	University / KVK / PMC	
2.2.4	Food Grain's Productivity Training & demonstration	DU	KVA	DPMU	BPMU	University / KVK / ICCOA / ATMA / PMC	
2.2.5	Provision of Farm Machinery	Preparation of bid document and procurement of suppliers	KVA	DPMU	DPMU	University / KVK / PMC	
		Procurement and delivery		LCB	DPMU	Suppliers	-
2.2.6	Provision of poly houses & poly tunnels	Preparation of bid document and procurement of suppliers	KVA	DPMU	DPMU	University / KVK / PMC	
		Procurement and setting up the facilities		LCB	DPMU	Suppliers	-
2.2.7	Program for Next Generation	Preparation of bid document and procurement of NGO	Community	DPMU	DPMU	PMC	
		Implementation		LCB	DPMU	NGO	PMC
2.3 Other activities							
2.3.1	R&D support	•Multi-location testing of CMS based hybrids of cauliflower in Himachal Pradesh -Breeding of new hybrids of cauliflower for cultivation in the state	DU	University	SPMU	KVK	PMC
		•Multi-location testing of GMS based bacterial wilt resistant hybrids of chilli in Himachal Pradesh -Breeding of new hybrids of chilli	DU	University	SPMU	KVK	PMC
		•Generation of double haploid through induced androgenesis in head cabbage (Brassica oleracea var. capitata L.) -Development of potential double haploids	DU	University	SPMU	KVK	PMC
		•Multilocal testing and validation of newly developed bacterial wilt resistant and high yielding bell pepper lines/hybrids in H.P -Identification of elite bacterial wilt resistant bell pepper lines/hybrids	DU	University	SPMU	KVK	PMC
		•Multilocal testing and validation of newly developed yellow vein mosaic virus resistant and high yielding okra lines/hybrids in H.P -Identification of elite yellow vein mosaic virus resistant okra	DU	University	SPMU	KVK	PMC
		•Development and promotion of management technology against insect-pests of brinjal -Development of pest management module on eco friendly	DU	University	SPMU	KVK	PMC
		•Management of root-knot nematode, Meloidogyne incognita in cucumber under protected cultivation -Development of effective management tactics under polyhouse	DU	University	SPMU	KVK	PMC
		•Assessment, validation and refinement of disease management technology for vegetable crops -development of integrated disease management technology in	DU	University	SPMU	KVK	PMC
		•Enhancing rice production in high-altitude areas of Himachal Pradesh by development and popularization of high yielding, cold tolerant japonica rice varieties through farmers' participatory	DU	University	SPMU	KVK	PMC
		•Genetic amelioration of Kala zeera (Bunium persicum Boiss) using tissue culture/micropropagation approach -Development of efficient micro propagation technology to shorten	DU	University	SPMU	KVK	PMC
•Popularization of potential A B C crops of North Western Himalayas as vegetable and seed under organic and natural farming conditions through participatory plant breeding. (A B C= Amaranthus,	DU	University	SPMU	KVK	PMC		
2.3.2	Infrastructure development at SAU for vegetable seed production	DPR preparation	DU	University	SPMU	SAU	PMC
		Pre construction activities	DU	University	SAU	SAU	-
		Construction	LCB	University	SAU	Local Contractor	-
2.4 Innovative activities							
2.4.1	Establishment of center of excellence for vegetable nursery production	Preparation of bid document and procurement of Contractor / Supplier	DU	University / KVK	SPMU	SPMU	DPMU
		Construction	LCB	University / KVK	SPMU	Local Contractor / Supplier	DPMU

Source : JICA Survey Team

Table 7.7.3 Procurement Method for Each Activity (3/4)

Particulars of Activity		Procurement Method	Target Group	Initiated by	Executed by	Assisted by	
2.4.2	Trial for soil less cultivation/Fan Pad GH with vertical system	DU	KVA	SAU	SAU	-	
2.4.3	Provision of tubular structure shade net houses	Preparation of bid document and procurement of Supplier	KVA	SPMU	SPMU	PMC	
		Supply the material		SPMU	Local Supplier	-	
2.4.4	Provision of plastic mulching material	Preparation of bid document and procurement of Supplier	KVA	SPMU	SPMU	PMC	
		Supply the material		SPMU	Local supplier	-	
2.4.5	Provision of Anti-Hail nets in hail prone areas	Preparation of bid document and procurement of Supplier	KVA	SPMU	SPMU	PMC	
		Supply the material		SPMU	Local supplier	-	
2.5 Livelihood support activities for on /off farm activities							
2.5.1	Formation and formalization of SHGs	Preparation of bid document and procurement of NGO	SHG	BPMU	BPMU	TCP	
		Implementation		LCB	BPMU	NGO	FMC
2.5.2	Mushroom cultivation on cost sharing basis 80:20	Preparation of bid document and procurement of NGO	SHG	BPMU	BPMU	Mushroom center	
		Implementation		LCB	BPMU	NGO	Mushroom center
2.5.3	Rearing of honey bees on cost sharing basis 80:20	Preparation of bid document and procurement of NGO	SHG	BPMU	BPMU	DoH / DoAH	
		Implementation		LCB	BPMU	NGO	DoH / DoAH
2.5.4	Dairy Farming on cost sharing basis 80:20 (2 cows/ Buffalos per unit)	Preparation of bid document and procurement of NGO	SHG	BPMU	BPMU	DoAH	
		Implementation		LCB	BPMU	NGO	DoAH
2.5.5	Back yard poultry on cost sharing basis 80:20 (50 birds Per unit)	Preparation of bid document and procurement of NGO	SHG	BPMU	BPMU	DoAH	
		Implementation		LCB	BPMU	NGO	DoAH
2.5.6	Service Sector Training (1,200 nos.)	DU	SHG	BPMU	Industrial Training Institutes (ITIs)	-	
2.5.7	Promotion of Shiitake Mushroom Cultivation	DU	SHG	SPMU	SCTC / BPMU	PMC	
2.5.8	Promotion of on farm of fish culture	Preparation of bid document and procurement of NGO	SHG	BPMU	BPMU	DOF	
		Implementation		LCB	BPMU	NGO	DoAH
2.6 Nutrition Improvement							
2.6.1	Dissemination of recipes using nutritious ingredients	DU	SHG	DPMU	BPMU	PMC	
2.6.2	Promotion of school garden		SHG	DPMU	BPMU	PMC	
2.6.3	Dissemination of kitchen garden for nutrition improvement		SHG	DPMU	BPMU	PMC	
3. Value Chain and Market Development Component							
3.1 Bringing FPOs up as a business entity							
3.1.1	Formation and formalization of FPO	DU	FPO	DPMU	PMC	-	
3.1.2	Business management training	Preparation of bid document and procurement of service provider	DU	FPO	DPMU	DPMU	PMC
		Implementation	LCB	FPO	DPMU	SFAC NABARD	PMC
3.1.3	Training on post harvest handling and value addition	DU	FPO	DPMU	University / KVK	PMC	
3.2 Establishment of FPO's Collection Center							
3.2.1	Construction of collection center	DPR preparation	DU	FPO	DPMU	BPMU	PMC
		Pre construction activities	DU	FPO	DPMU	BPMU	PMC
		Construction	LCB	FPO	DPMU	Local Contractor	BPMU / PMC
3.2.2	Procurement of machinery & equipment and O & M training	Preparation of bid document and procurement of suppliers	DU	FPO	DPMU	DPMU	BPMU / PMC
		Procurement of machinery & equipment	LCB	FPO	DPMU	Local supplier	BPMU / PMC
		O&M training	LCB	FPO	DPMU	Local supplier	BPMU / PMC

Source : JICA Survey Team

Table 7.7.4 Procurement Method for Each Activity (4/4)

Particulars of Activity		Procurement Method	Target Group	Initiated by	Executed by	Assisted by	
3.3 Matching FPOs with agribusiness operators							
3.3.1	Matching FPOs with agribusiness operators	DU	FPO agribusiness operator	DPMU	PMC	SFAC NABARD	
3.3.2	Facilitation of pilot business trials		FPO agribusiness operator	DPMU	PMC	SFAC NABARD	
3.4 Modernizing facilities and equipment in Mandis							
3.4.1	Facility construction with equipment	DPR preparation	DU	HPSAMB	DPMU	HPSAMB / PWD	PMC
		Pre construction activities	DU	HPSAMB	HPSAMB	HPSAMB	-
		Construction / procurement	LCB	HPSAMB	HPSAMB	Local suppliers	-
		O & M of facilities & equipment		HPSAMB	HPSAMB	Local suppliers	-
3.5 Empowerment of CA							
3.5.1	Empowerment of CA	Preparation of bid document and procurement of service provider	DU	CA	HPSAMB	HPSAMB	PMC
		Implementation	LCB	CA	HPSAMB	Local Consultant	PMC
4. Institutional Development Component							
4.1 Strengthening of DOA							
4.1.1	Recruitment of PMU Staff (Out-Source)	DU	SPMU/DPMU/B PMU	DoA	DoA		
4.1.2	Capacity Development of Project Staff on PDCA Cycle	DU	PMU/DPMU/B PMU	SPMU	PMC / University	TCP	
4.1.3	Review of overall project implementation plan	DU	PMU/DPMU/B PMU	SPMU	SPMU	TCP	
4.1.4	Preparation, monitoring and update of supply chain and market development plan	DU	-	SPMU	DPMU	PMC	
4.1.5	Preparation, monitoring and update of crop diversification plan for each sub-project	DU	-	DPMU	BPMU	TCP / PMC	
4.1.6	Procurement of ICT related equipment & Establishment of MIS & GIS and Monitoring System	Preparation of bid document and procurement of supplier / service provider	DU	PMU/DPMU/B PMU	SPMU	SPMU	University / PMC
		Implementation	LCB	PMU/DPMU/B PMU	SPMU	Local IT Company / Supplier	University / PMC
4.1.7	Construction of Training Centers	DPR preparation	LCB	SPMU	SPMU	PMC	-
		Pre construction activities		SPMU	SPMU	SPMU	-
		Construction / procurement		SPMU	SPMU	Local Contractor	-
4.1.8	Procurement of Equipment and Tools to PMU	Preparation of bid document and procurement of supplier	DU	SPMU/DPMU/B PMU	SPMU	SPMU	-
		Procurement of equipment	LCB	SPMU/DPMU/B PMU	SPMU	Local Contractor / Local Supplier	-
4.2 Strengthening of Extension Service Function							
4.2.1	Preparation of Information, Education and Communication (IEC) Material for Dissemination	DU	DDA/Community	DPMU/DDAs	BPMU	PMC	
4.2.2	Capacity Development of Agriculture Extension Staff	DU	DDA/DPMU/B PMU	PMU/DoA	PMC	University / KVK/ SAMETI	
4.2.3	Capacity Development of Engineering Staff	DU	DDA/DPMU/B PMU	PMU/DoA	PMC	University / KVK/ SAMETI	
4.2.4	Strengthening of Research- Extension-Farmer Linkages and joint visits	DU	DDA/DPMU/B PMU/University / KVK	SPMU	DPMU	PMC	
4.2.5	International/national/state level workshop/seminars	DU	Stakeholders	SPMU	PMC	Private promoter	
4.2.6	Overseas Training , Exposure/Study visits of Project staff and other stakeholders	DU	PMU/DPMU/B PMU/DoE	SPMU	PMC	Private promoter	
4.2.7	Upgrading of infrastructure of State Agriculture Management and Extension Training Institute (SAMETI)	DPR preparation	DU	SAMETI	SPMU	SAMETI	-
		Pre construction activities	DU	SAMETI	SAMETI	SAMETI	-
		Construction / procurement	LCB	SAMETI	SAMETI	Local Contractor	-
4.3 Baseline Survey and Impact Assessment							
4.3.1	Conduct baseline survey	DU	Community	SPMU	SPMU	TCP	
4.3.2	Conduct mid-line survey	DU	Community	SPMU	SPMU	PMC	
4.3.3	Conduct end-line survey	DU	Community	SPMU	SPMU	PMC	

Source : JICA Survey Team

7.8 Implementation Schedule of the Project

The implementation schedule of the Project is shown in the next table. Construction of Shiitake Cultivation Training Centre (SCTC) was taken up in the Himachal Pradesh Crop Diversification Promotion Project JICA ODA. The machinery for SCTC was imported from Japan. The most important machinery of the SCTC is an autoclave manufactured in Japan, which was to be procured from Japan. The machinery and equipment procured from Japan should be installed and commissioned by the authorized technician. However, it is difficult to install the Autoclave, due to COVID-19 pandemic.

Meanwhile three disseminators that is two disseminators from DoA and one disseminator from SAU, Palampur had overseas training in Japan for 85 days in 2018.

After installation of the autoclave and other equipment, it is required that the test operation of those machineries should be conducted, and training to the factory workers for operation & maintenance of these machines should be provided by the disseminators.

After test operation mentioned above, it is proposed that types of spawn as well as sizes of saw dust medium should be tested, in order to identify the proper spawn and compounding pattern. As for getting those results, it takes around 9 months including inoculation / incubation (3 months) and test cultivation periods (6 months).

It is intimated that PMU has already proceeded the preliminary work on identification of types of spawn as well as sizes of saw dust medium, using the existing equipment of the SAU, Palampur. It is expected that some useful results be clarified before installation of the autoclave.

Namely commercial cultivation as well as training of farmers could be proceeded after those test operations described above, as shown in the following schedule.

Table 7.8.1 Tentative Implementation Schedule for Shiitake Mushroom Cultivation

Sr. No.	Activity	2021												2022					
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
1	Arrangement of sawdust (sawchips)	.....	.....														
2	Preparation of sawdust block manufacturing (arrangements of all raw materials)	.....	.....														
3	Purchase of Shiitake seeds and nutrition for sawdust spawn making	.....	.....														
4	Installation and commissioning of Autoclave and Stuffing Machine (tentative)				■														
5	Inoculation of Shiitake spawn / Maturation (incubation) of sawdust block				.....	.....	.....	.....	.....	.....	.....	.....
6	Trial Shiitake cultivation							.....	.....	.....	.....	.....		
7	Evaluation of harvested Shiitake (once a month)							✓	✓	✓	✓	✓	✓						
8	Selection of proper compounding pattern of raw materials of sawdust block												✓						
9	Orientation and awareness camp for farmers				.....	.....	.....	.....	.....	.....	.....	.....
10	Training on Shiitake cultivation for farmers													.....	.....	.....	.....	.....	.....
11	Commercial cultivation													.....	.....	.....	.....	.....	.....
12	Market research													.....	.....	.....	.....	.....	.....
13	Training of disseminators through remote advices by Japanese experts (not fixed)	.....	.....														
14	Training of disseminators at SCTC by Japanese experts (not fixed)				...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Remarks:

1.: Activities No. 1 and 2 are on-going.

2.: Activities No. 3 should be arranged, depending on the result of No. 2.

3.: Activity No.,4 could be conducted by Japanese supplier. Timing is not fixed due to COVID-19.

4: Activity No. 13 is proposed to upgrade skills of disseminators (not yet fixed).

Source: JICA Survey Team, based on information from PMU

Further, it seems that the disseminators have less experience on selection of proper compounding pattern of raw materials of sawdust block. It is apprized that they need more technical support to strengthen their skills on Shiitake cultivation.

Table 7.8.2 Implementation Schedule of the Project (1/4)

Particulars of Activity		2021			2022			2023			2024			2025			2026			2027			2028			2029			2030																		
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
1. Infrastructure Development Component																																															
1.1 Infrastructure Development for sub-projects																																															
1.1.1	Minor Irrigation	DPR preparation				■						■						■						■																							
		Pre construction activities				■						■						■						■																							
		Construction				■			■			■			■			■			■			■			■			■			■			■											
1.1.2	Micro Irrigation Schemes	DPR preparation							■			■			■						■						■																				
		Pre construction activities							■			■			■						■						■																				
		Procurement										■			■			■			■			■			■			■			■			■											
1.1.3	Catchment area treatment	DPR preparation	■						■			■			■						■																										
		Pre construction activities	■						■			■			■						■																										
		Construction	■			■			■			■			■			■			■			■			■			■			■			■											
1.1.4	Provision of Solar powered pumping machinery for lift irrigation and STW	DPR preparation	■						■			■			■						■																										
		Pre construction activities	■						■			■			■						■																										
		Construction / procurement	■			■			■			■			■			■			■			■			■			■			■			■											
1.1.5	Farm access roads	DPR preparation	■						■			■			■						■																										
		Pre construction activities	■						■			■			■						■																										
		Construction	■			■			■			■			■			■			■			■			■			■			■			■											
1.1.6	Solar/ electric fencing for protection of vegetables on cost sharing	DPR preparation				■			■			■			■						■																										
		Pre construction activities				■			■			■			■						■																										
		Procurement							■			■			■			■			■			■			■			■			■			■											
1.2 Crop Diversification through Convergence in created irrigation potential of irrigation Schemes of IPH/DOA																																															
1.2.1	Improvement of existing irrigation schemes for distribution system	DPR preparation	■																																												
		Pre construction activities	■																																												
		Construction	■			■			■			■			■			■			■			■			■			■			■			■											
1.2.2	Micro Irrigation Schemes	DPR preparation				■			■			■			■																																
		Pre construction activities				■			■			■			■																																
		Procurement							■			■			■			■			■			■			■			■			■			■											
1.3 Infrastructure development support																																															
1.3.1	Miscellaneous of above works (Infrastructure development support)				■			■			■			■			■			■			■			■			■			■			■												
2. Farmers Support Component (including 10 sub-projects of Convergence Irrigation Schemes of IPH/DOA)																																															
2.1 Formation and Strengthening KVA																																															
2.1.1	Awareness Camp involving Community	■						■			■			■			■			■			■			■			■			■			■												
2.1.2	Formation and formalization of KVAs	■						■			■			■			■			■			■			■			■			■			■												
2.1.3	Capacity development of KVAs for O&M Management							■			■			■			■			■			■			■			■			■			■												
2.2 Vegetable Promotion																																															
2.2.1	Incubation and capacity development of community motivators	■						■			■			■			■			■			■			■			■			■			■												
2.2.2	Farm Economy Management, Training on farm management by farm type (advanced, intermediate and conservative)				■			■			■			■			■			■			■			■			■			■			■												

Source : JICA Survey Team

Table 7.8.5 Implementation Schedule of the Project (4/4)

Particulars of Activity	2021			2022			2023			2024			2025			2026			2027			2028			2029			2030																			
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2
4. Institutional Development Component																																															
4.1 Strengthening of DOA																																															
4.1.1	Recruitment of PMU Staff (Out-Source)																																														
4.1.2	Capacity Development of Project Staff on PDCA Cycle																																														
4.1.3	Review of overall project implementation plan																																														
4.1.4	Preparation, monitoring and update of supply chain and market development plan																																														
4.1.5	Preparation, monitoring and update of crop diversification plan for each sub-project																																														
4.1.6/4.1.7	Procurement of ICT related equipment & Establishment of MIS & GIS and Monitoring System																																														
	Preparation of bid document and procurement of supplier / service provider																																														
4.1.8	Construction of Training Centers																																														
	DPR preparation																																														
	Pre construction activities																																														
4.1.9	Procurement of Equipment and Tools to PMU																																														
	Procurement of equipment																																														
4.2 Strengthening of Extension Service Function																																															
4.2.1	Preparation of Information, Education and Communication (IEC) Material for Dissemination																																														
4.2.2	Capacity Development of Agriculture Extension Staff																																														
4.2.3	Capacity Development of Engineering Staff																																														
4.2.4	Strengthening of Research- Extension-Farmer Linkages and joint visits																																														
4.2.5	International/national/state level workshop/seminars																																														
4.2.6	Overseas Training , Exposure/Study visits of Project staff and other stakeholders																																														
4.2.7	Upgrading of infrastructure of State Agriculture Management and Extension Training Institute (SAMETI)																																														
	DPR preparation																																														
	Pre construction activities																																														
4.3 Baseline Survey and Impact Assessment																																															
4.3.1	Conduct baseline survey																																														
4.3.2	Conduct mid-line survey																																														
4.3.3	Conduct end-line survey																																														
4.4 Gender mainstreaming																																															

NOTE : ■ Batch 1 related activities
■ Batch 2 related activities
■ Batch 3 related activities
■ Batch 4 related activities
■ Batch 5 related activities
■ Common activities

Source : JICA Survey Team

Chapter 8 Project Cost

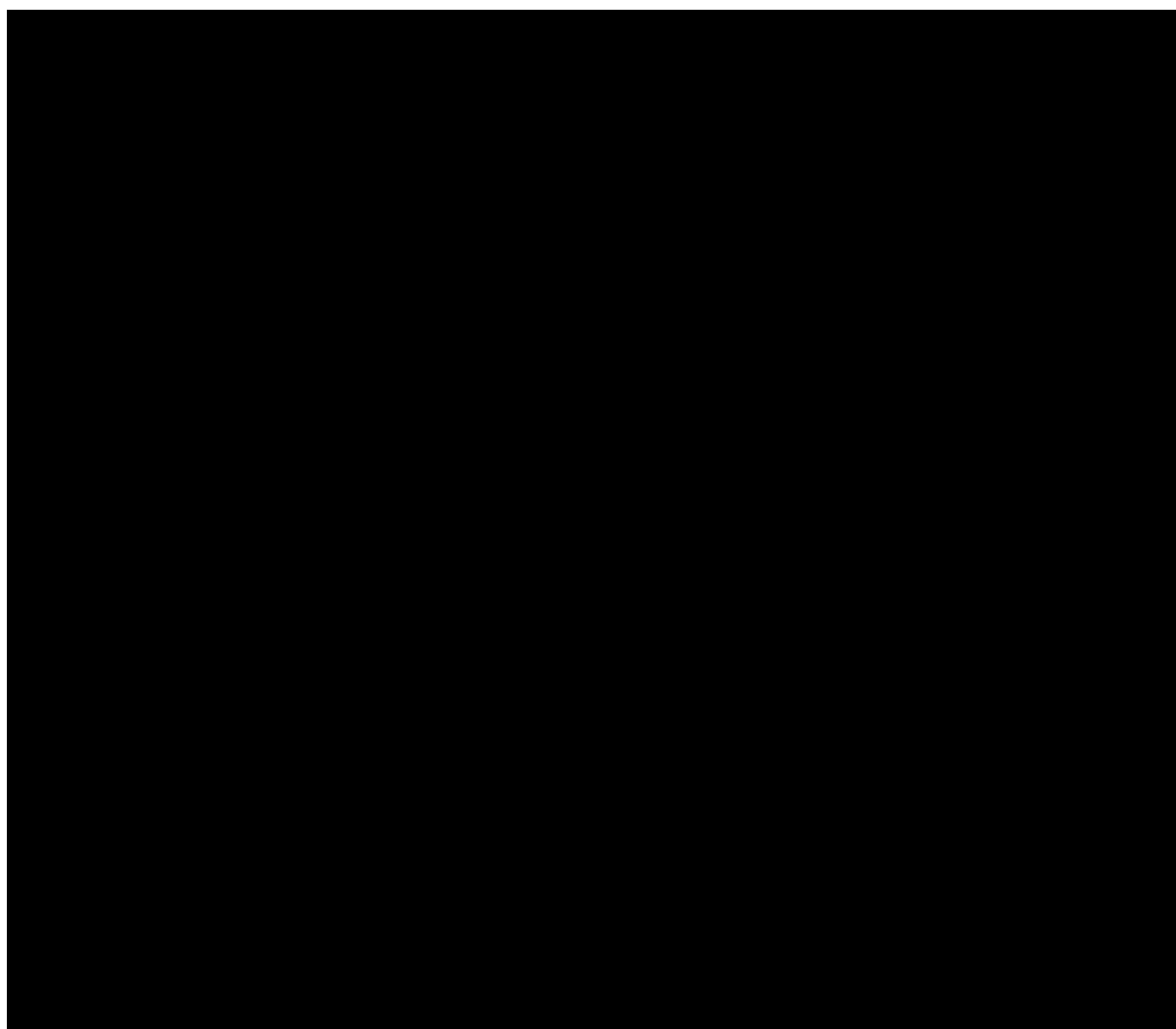
8.1 Basic Conditions of the Project Cost

The project costs are estimated based on the latest data and information obtained from DOA related to the 306 sub-projects during the survey period. The details of the project cost estimate applied by DOA are as below.

8.1.1 Contents of Cost Estimation

- a) Direct cost for procurement and works
 - : Infrastructure Development Component,
 - : Farmers' Support Component,
 - : Value Chain and Market Development Component,
 - : Institutional Development Component,
- b) Consulting services,
- c) Administration expenses during the construction period,
- d) Price escalation and physical contingencies, and
- e) Tax, interest during construction and commitment charge.

8.1.2 Conditions and Assumption



8.2 Summary of the Project Cost

8.2.1 Summary



Table 8.2.1 Summary of Project Cost

Non-disclosure information

Source: JICA Survey Team

8.2.2 Infrastructure Development Component

The infrastructure development cost includes (1) Minor Irrigation, (2) Micro Irrigation Systems, (3) Catchment Area Treatment, (4) Solar Pumping, (5) Access Farm Roads, (6) Solar/ electric fencing, (7) Crop Diversification through Convergence in created irrigation potential of irrigation Schemes of IPH/DOA, (8) Miscellaneous of above works (Infrastructure development support), and (9) Survey, Investigating, Designating & Estimation as follows.

Table 8.2.2 Summary of Infrastructure Development Component

Non-disclosure information

Source: JICA Survey Team

8.2.3 Farmers' Support Component

The farmers' support component includes: (1) Formation and Strengthening KVA, (2) Vegetable Promotion, (3) Other activities including R&D support, Assistance for soil testing kits, and Infrastructure development at SAU for vegetable seed production, (4) Innovative activities, (5) Livelihood support activities for on /off farm activities and service sector activities and (6) Nutrition Improvement Program as follows:

Table 8.2.3 Summary of Farmers' Support Program Cost

Non-disclosure information

Source: JICA Survey Team

8.2.4 Value Chain and Market Development Component

The Value Chain and Market Development Component includes (1) Bringing FPOs up as a business entity, (2) Establishment of FPO's Collection Center, (3) Matching FPOs with agribusiness operators and Facilitation of pilot business trials, (4) Modernizing facilities and equipment in Mandis, and (5) Empowerment of CAs as follows.

Table 8.2.4 Summary of Value Chain, Market Development Component

Non-disclosure information

Source: JICA Survey Team

8.2.5 Institutional Development Component

The institutional development Component consists of (1) Strengthening of DOA, (2) Strengthening of Extension Service Function, (3) Baseline Survey and Impact Assessment as follow.

Table 8.2.5 Institutional Development Component

Non-disclosure information

Source: JICA Survey Team

8.2.6 Consulting Service

The Consulting Service consists of (1) Base Cost, (2) Price Escalation, and (3) Physical Contingency. The Base Cost includes remuneration and direct costs such as Airfare, Accommodation Allowance, Vehicle Rental, Office Supply etc. and summarized below table:

Table 8.2.6 Summary of Consulting Services Cost

Non-disclosure information

Source: JICA Survey Team

8.2.7 Administration and Other Costs

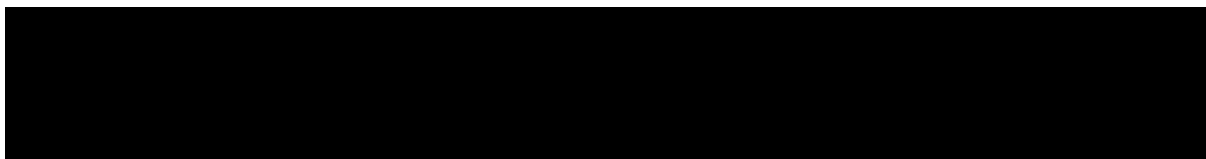


Table 8.2.7 Summary of Project Cost

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Non-disclosure information

*Note: INR 1.00 = JPY
F/C Foreign currency, L/C Local currency
Source: JICA Survey Team*

Table 8.2.8 Summary of Infrastructure Development Component Cost

Non-disclosure information

Source: JICA Survey Team

Table 8.2.9 Summary of Farmers' Support Component Cost

Non-disclosure information

Source: JICA Survey Team

Table 8.2.10 Summary of Value Chain and Market Development Component Cost

Non-disclosure information

Source: JICA Survey Team

Table 8.2.11 Summary of Institutional Development Component Cost

Non-disclosure information

Source: JICA Survey Team Annual Disbursement Schedule

8.3 Annual Disbursement Schedule

The annual disbursement schedule is worked out based on the detailed design time and the construction time schedule. The summary is presented below table:

Table 8.3.1 Summary of Annual Disbursement Schedule

Non-disclosure information

Source: JICA Survey Team

8.4 Cost Reduction Measures

Cost, time and quality are crucial aspects of the construction project and trade-off among them is an important factor when planning the project. It is well known that there is a trade-off between quality and project cost when formulating the optimal implementation plan. The JICA Study Team examined the possibility of cost reduction within acceptable quality and project implementation period.

For the project implementation, the JICA Study Team proposes the following improvements and measures for the purpose of cost reduction (details are described in Section 6):

8.4.1 Appropriate bidding method

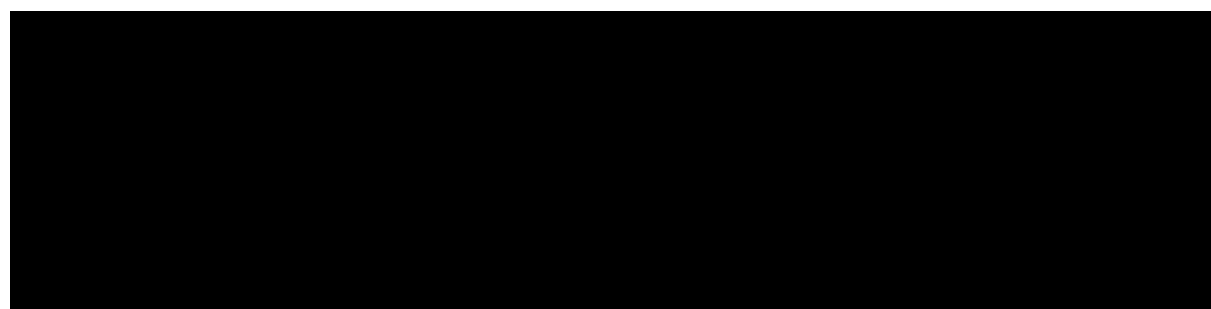
It should be applied a local competitive bidding (LCB) for the irrigation development works to select the responsible and capable local construction firms at lower contract price, and it should be obligated and use of relatively new and well managed construction machineries to be stipulated in the bid documents to avoid delay of the works due to frequent damage of construction machineries.

8.4.2 Formulation of optimal construction plan

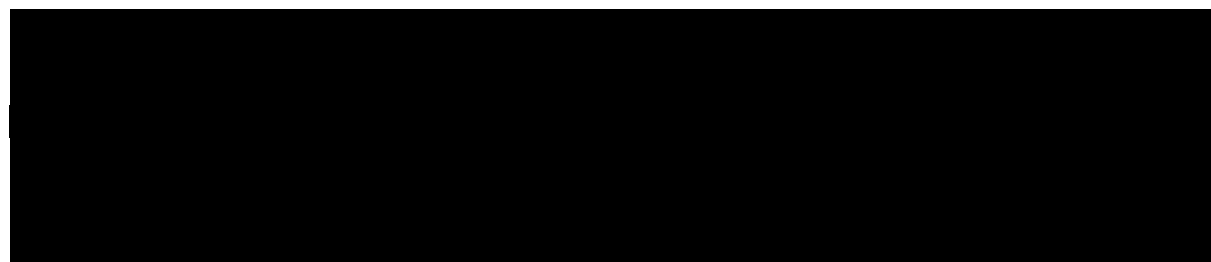
It should be prepare an optimal construction plan, with starting construction work from 5 district where existing BPMU (Bilaspur, Hamirpur, Kangra, Mandi, Una) are there to average the number of subprojects to be constructed. It can make contribute reduction of delay of works.

It should be prepared a simple procurement plan to minimise the time requirement for the Project because of the project nature (large number of contract packages)

8.4.3 Identification of Suitable Land for Micro Irrigation



8.4.4 Selection of Appropriate Type of Micro Irrigation Facilities



Chapter 9 Project Evaluation

9.1 Financial Capacity of the State Government

9.1.1 State Budget of Himachal Pradesh

(1) State Budget

The total annual expenditure of the Government of Himachal Pradesh in 2019-2020 (Budget Estimated (BE)) is approximately INR 443,877 million (INR 58,000 per population), which accounts for 38% of the gross state domestic products (GSDP) of Himachal Pradesh in 2018-2019 (INR 1,178,510 million). Breakdown of the annual receipts and expenditures is shown in Table 9.1.1.

Table 9.1.1 Annual Budget of the Government of Himachal Pradesh (2019-2020)

Receipts	INR in Million	Share in Total
Revenue Receipts	337,469.5	80.2%
Tax Revenue	153,194.3	36.4%
Non-Tax Revenue	24,428.6	5.8%
Grants-in-aid for Central Government	159,846.6	38.0%
Capital Receipts	83,574.8	19.8%
Recoveries of Loans	267.3	0.1%
Public Debt (incurred)	70,807.5	16.8%
Non-Debt Receipts	0.0	0.0%
Deposits & Advances Remittances and Provident Fund	12,500.0	3.0%
Contingency Fund	0.0	0.0%
Total Receipts	421,044.3	100.0%
Expenditure	INR in Million	Share in Total
Revenue Expenditure	360,890.3	81.3%
General Services	143,512.8	32.3%
Social Services	138,951.3	31.3%
Economic Services	78,318.0	17.6%
Grants & Contributions	108.2	0.02%
Capital Expenditure	45,798.9	10.3%
General Services	1,812.3	0.4%
Social Services	12,610.7	2.8%
Economic Services	31,375.9	7.1%
Loan and Advances	4,570.6	1.0%
Public Debt	32,617.5	7.3%
Contingency Fund	0.0	0.0%
Total Expenditure	443,877.3	100.0%
Balance	-22,833	
Fiscal Deficit	-73,523	

Source: Budget at Glance/Budget Study, Finance Department, Government of Himachal Pradesh

Fiscal deficit of the Government of Himachal Pradesh is INR 73.5 billion, which accounts for 17% of the total expenditure and 6% of GSDP.

(2) State Public Debt

The following table shows the state-wise comparison of fiscal deficit in the budget 2018-2019 (BE), GSDP, and ratio of deficit/GSDP in the budget 2016-2017 (current price). Average ratio of fiscal deficit/GSDP of special category states is 4.4%, while the ratio of Himachal Pradesh is 6.2%, which is relatively higher compared with the national average.

Table 9.1.2 State-wise Fiscal Deficit/Surplus and GSDP

(Unit: INR in Billion)

State	2018-2019 (BE)			Current Price 2016-2017	
	Receipts	Expenditure	Surplus (-)/ Deficit (+)	GSDP	Ratio of Deficit/GSDP
Non-special Category					
Andhra Pradesh	1,555.1	1,797.1	242.1	6,844.2	3.5%
Bihar	1,580.5	1,692.6	112.0	4,210.5	2.7%
Chhattisgarh	728.7	828.7	100.0	2,508.8	4.0%
Goa	118.8	159.9	41.1	629.8	6.5%
Gujarat	1,406.4	1,662.2	255.8	11,671.6	2.2%
Haryana	779.7	973.7	194.0	5,616.1	3.5%
Jharkand	691.3	766.2	74.9	2,362.5	3.2%
Karnataka	1,664.7	2,072.2	407.5	12,091.4	3.4%
Kerala	1,028.4	1,268.0	239.6	6,348.9	3.8%
Madhya Pradesh	1,558.9	1,826.7	267.8	6,498.2	4.1%
Maharashtra	2,859.7	3,365.5	505.9	21,983.2	2.3%
Odisha	1,002.0	1,157.2	155.2	3,927.1	4.0%
Punjab	738.1	935.3	197.2	4,269.9	4.6%
Rajasthan	1,516.9	1,797.0	280.1	7,607.5	3.7%
Tamil Nadu	1,762.5	2,207.3	444.8	13,026.4	3.4%
Telangana	1,309.8	1,600.5	290.8	6,583.3	4.4%
Uttar Pradesh	3,486.2	3,926.7	440.0	12,902.9	3.4%
West Bengal	1,467.5	1,705.5	238.1	8,725.3	2.7%
Total Non-special Category	25,255.2	29,742.3	4,487.4	137,807.4	3.3%
Special Category					
Arunachal Pradesh	175.5	181.0	5.5	198.5	2.8%
Assam	741.2	838.9	97.7	2,543.8	3.8%
Himachal Pradesh	304.0	382.2	78.2	1,256.3	6.2%
Jammu and Kashmir	642.7	719.9	77.2	1,248.5	6.2%
Manipur	126.5	132.6	6.1	212.9	2.9%
Meghalaya	125.3	136.8	11.5	274.4	4.2%
Mizoram	89.1	91.7	2.6	171.9	1.5%
Nagaland	125.9	134.5	8.6	217.2	4.0%
Sikkim	59.8	66.7	6.9	206.9	3.3%
Tripura	140.1	156.2	16.1	394.8	4.1%
Uttarakhand	356.6	423.7	67.1	1,951.3	3.4%
Total Special Category	2,886.7	3,264.2	377.5	8,676.5	4.4%

Source: State Finances a Study of Budgets of 2018-19, Reserve Bank of India/Ministry of Statistics and Programme Implementation
Note: BE is Budget Estimates.

The following table shows the amount of public debt of the Government of Himachal Pradesh. Borrowings and other liabilities accounted for 16.8% of receipts of the budget in 2019-2020, which is 6.0% of the GSDP. Repayment of debt accounts for 7.7% of the expenditure. The amount of annual repayment in the recent three years is around INR 20 to 40 billion.

Table 9.1.3 Public Debt of the Government of Himachal Pradesh in the Last Three Years

(Unit: INR in Million)

	2017-2018	2018-2019	2019-2020
Internal Debt of the State Government			
Incurred	55,184.0	78,784.3	70,224.0
Repayment	34,209.6	45,378.4	31,747.9
Loans and Advanced from the Central Government			
Incurred	818.9	654.7	583.5
Repayment	788.9	850.6	869.6
Total Public Debt			
Incurred	56,002.9	79,439.0	70,807.5
Repayment	34,998.5	46,229.0	32,617.5
Net Public Debt	21,004.4	33,210.0	38,190.0

Source: Budget at Glance/Budget Study, Finance Department, Government of Himachal Pradesh

(3) Sector-wise Outlay

Proportion of sector-wise outlay allocation is shown in the following table. According to BE in 2019-2020, the Government of Himachal Pradesh allocated 12.36% of the total outlay in the budget for the agriculture sector.

Table 9.1.4 Sector-wise Outlay of the Government of Himachal Pradesh in 2019-2020

No.	Sector	INR in Million	Share in Total
1	Agriculture & Allied Activities	8,772.5	12.36%
2	Rural Development	1,336.5	1.88%
3	Special Area Programme	277.8	0.39%
4	Irrigation and Flood Control	4,574.8	6.44%
5	Energy	7,110.6	10.01%
6	Industry & Minerals	955.9	1.35%
7	Transport & Communication	12,419.8	17.49%
8	Science, Technology & Environment	280.2	0.53%
9	General Economic Services	3,551.5	4.72%
10	Social Services	30,481.5	42.93%
11	General Services	1,338.9	1.88%
Total Plan Expenditure		71,000.0	100.00%

Source: Annual Plan 2019-2020, Planning Department, Government of Himachal Pradesh

The outlay of agriculture sector in the last three years is shown as follows. Ratio of allocated budget for the agriculture sector is almost stable at around 12-13% in recent years.

Table 9.1.5 Outlay of Agriculture Sector of the Government of Himachal Pradesh in the Last Three Years

(Unit: INR in Million)

Sector	2017-2018		2018-2019		2019-2020	
	Outlay	% of Total	Outlay	% of Total	Outlay	% of Total
Agriculture & Allied Activities	7,136.6	12.52%	8,438.8	13.39%	8,772.5	12.36%
Other Sectors	49,863.4	87.48%	54,561.2	86.61%	62,227.5	87.64%
Total Outlay	57,000.0	100%	63,000.0	100%	71,000.0	100%

Source: Annual Plan 2017-2018, 2018-2019, 2019-2020, Planning Department, Government of Himachal Pradesh

9.1.2 Financial Capability of the State Government

(1) Budget of Agriculture and Allied Sector

Budget for agriculture and allied sector is allocated to the Department of Agriculture (DoA), Department of Horticulture (DoH), Department of Animal Husbandry, etc., in the State of Himachal Pradesh as shown in the following table. The budget consists of the state budget, Externally Aided Projects (EAPs) and central supported schemes such as Rural Infrastructure Development Fund (RIDF) and Rashtriya Krishi Vikas Yojana (RKVY). All schemes are managed by the state government.

Table 9.1.6 Budget Allocation of Agriculture Sector of the Government of Himachal Pradesh

(Unit: INR in Million)

Agriculture & Allied Activities Head of Department	2018-2019		2019-2020	
	Budget	% of Total	Budget	% of Total
Crop Husbandry	2,991.6	35.45%	2,890.9	32.95%
Agriculture	1,474.4		120.9	
Horticulture	1,517.2		1,681.9	
Soil and Water Conservation	700.0	8.30%	613.0	6.99%
Agriculture	606.5		518.0	
Forest	93.5		95.0	
Animal Husbandry	488.9	5.79%	484.2	5.52%
Animal Husbandry	488.9		484.2	
Dairy Development	170.0	2.01%	179.8	2.05%
Dairy Development	170.0		179.8	

Agriculture & Allied Activities Head of Department	2018-2019		2019-2020	
	Budget	% of Total	Budget	% of Total
Fisheries	72.5	0.86%	95.0	1.08%
Fisheries	72.5		95.0	
Forestry and Wildlife	2,156.2	25.55%	2,417.4	27.56%
Forestry	2,041.1		2,277.2	
Wildlife	115.1		140.2	
Agriculture Research & Education	1,677.7	19.88%	1,911.9	21.79%
Agriculture	900.0		1,000.0	
Horticulture	770.0		900.0	
Animal Husbandry	2.5		6.5	
Forest	4.9		5.0	
Fisheries	0.3		0.4	
Marketing and Quality Control	164.7	1.95%	164.7	1.88%
Agriculture	0.0		0.0	
Horticulture	164.7		164.7	
Co-operation	17.2	0.20%	15.6	0.18%
Co-operation	17.2		15.6	
Total Budget	8,438.8	100%	8,772.5	100%

Source: Annual Plan 2018-2019, 2019-2020, Planning Department, Government of Himachal Pradesh

The budget of agriculture and allied activities sector is allocated more than 30% for crop husbandry including extension activities headed by DoA and DoH in last two years.

(2) Financial Capability of the State Government

For agriculture and allied activities sector, the allocation of the state budget is 68.3%, and the provision from RIDF as central government assistance is 4.0%. EAPs contribute 27.7% of the total budget as shown in the following Table 9.1.7.

Table 9.1.7 Allocation for Agriculture Sector of the Government of Himachal Pradesh for 2019-2020

Description	% Share	Remarks
1. State budget allocations	68.3%	
2. Through central government (RIDF)	4.0%	- Covers the components on soil conservation for agriculture and allied activities
3. External assistance	27.7%	- Himachal Pradesh Horticulture Development Project by the World Bank, ongoing - Himachal Pradesh Forest Ecosystem Climate Proofing Project by KfW Bankengruppe, ongoing - Crop Diversification Promotion in Himachal Pradesh Phase-II by JICA, new - Himachal Pradesh Ecosystem Management and Livelihood Project by JICA, new - Integrated Development Project for Source Sustainability and Climate Resilient Rainfed Agriculture by the World Bank, new

Source: Annual Plan 2019-2020, Planning Department, Government of Himachal Pradesh

The proposed project cost was estimated at INR 10,296 million in total from 2021 to 2029 including eligible and non-eligible portions. Maximum annual disbursement of the project will be INR 1,612 million per year. This has been compared with the annual plan outlay for the agriculture sector as presented in the following table. The same comparison of the agriculture sector project in India funded by the Japan International Cooperation Agency (JICA) is shown for reference.

Table 9.1.8 Comparison of Annual Expenditures and the Project Budget

Description	Average Annual Expenditure in the State (INR in Million)	Comparison to the Project Maximum Annual Disbursement
		(INR in Million/Percentage)
(1) Average in the past three fiscal years	8,116	1,612 / 19.9%
(2) Comparison to other agriculture projects in India at the Preparatory Survey Stage		
1. APILIP, Andhra Pradesh 1/	18,009	3,182 / 17.7%
2. HPCDP, Himachal Pradesh 2/	2,560	805 / 31.4%

Description	Average Annual Expenditure in the State (INR in Million)	Comparison to the Project Maximum Annual Disbursement
		(INR in Million/Percentage)
3. Rengali Irrigation Project Phase-II, Odisha 3/	40,245	5,500 / 13.7%
4. RWSLIP, Rajasthan 4/	14,491	5,011 / 34.6%

Source: Prepared by the JICA Survey Team based on

1/ Final Report, SAPROF for Andhra Pradesh Irrigation and Livelihood Improvement Project, 2006

2/ Final Report, Preparatory Survey on ODA Loan for Crop Diversification in Himachal Pradesh, 2010"

3/ Final Report, Rengali Irrigation Project LBC-II Phase-II Formulation Report, 2015

4/ Final Report, Preparatory Survey on Rajasthan Water Sector Livelihood Improvement Project, 2016"

The JICA Survey Team has concluded based on the above comparison result that those dominant percentages in the annual expenditures of the Project could be acceptable amounts for implementation agency of the State of Himachal Pradesh.

9.2 Economic Evaluation Methodology and Assumption

9.2.1 Method of Economic Evaluation

Economic evaluation is carried out to access the economic viability of the pilot site cascade systems. In order to evaluate the cascade systems, indicators such as economic internal rate of return (EIRR), cost-benefit ratio (B/C), and net present value (B-C) are calculated by estimating the cash outflow (costs) and inflow (benefits) on annual basis over the project life with a certain discount rate by discount cash flow method (DCF method). The EIRR is a discount rate at which the present value of the in and out cash flows become equal. This rate shows the return to be expected from the Project as expressed in the following equation:

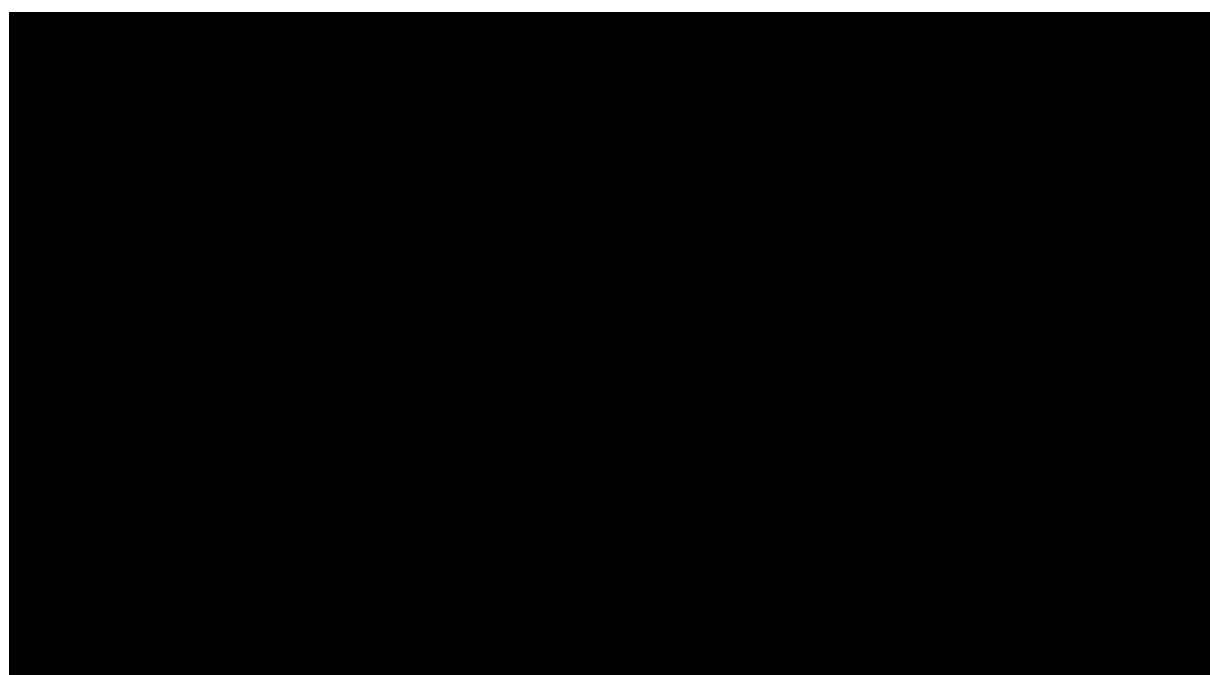
$$\sum_{t=0}^n B_t / (1 + r)^t - \sum_{t=0}^n C_t / (1 + r)^t = 0$$

where C_t is Cost, B is Benefit, t is Year, n is Project Life (year), and r is Discount Rate (EIRR).

The sensitivity analysis is also carried out to evaluate the viability of the cascade systems against possible adverse change in the future.

The financial internal rate of return (FIRR) is not calculated because FIRR is an indicator to access the financial sustainability of the implementation agency with direct return from project activities such as airport, water supply project, etc.

9.2.2 Basic Assumption of Economic Evaluation



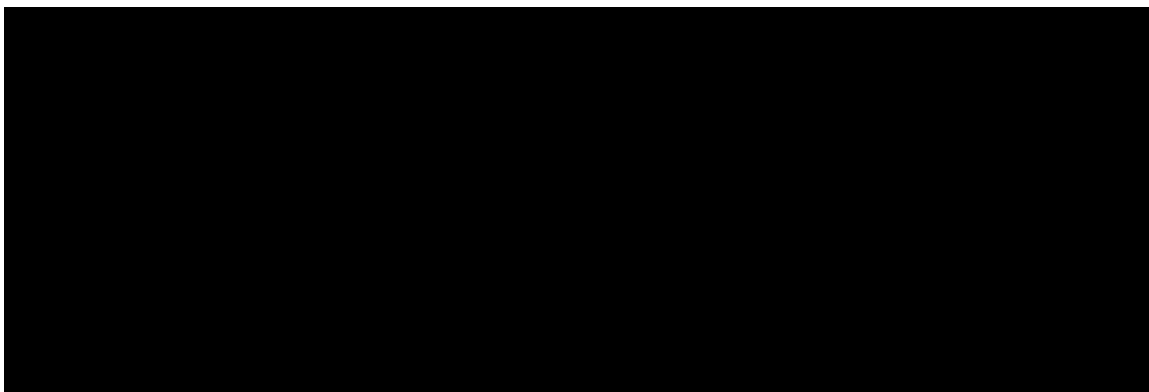
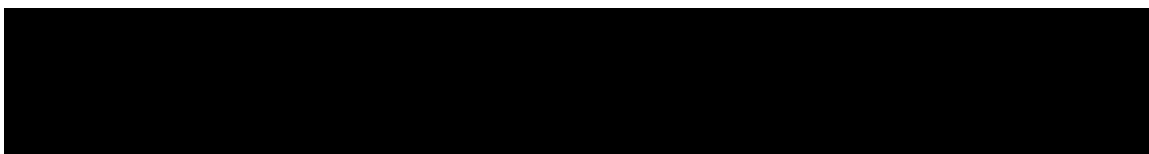


Table 9.2.1 Calculation of Standard Conversion Factors

Non-disclosure information

Source: JICA Survey Team based on the statistical data from the World Integrated Trade Solution (WITS), <https://wits.worldbank.org/>



9.3 Project Economic Cost

Based on the financial cost described in Chapter 8, the economic project cost is estimated using the abovementioned conversion method to the economic price. The project economic cost includes all the project components for infrastructure development component, farmers support component, institutional component, value chain and market development component.

The economic cost is shown in the following table.

Table 9.3.1 Economic Cost of the Project

Non-disclosure information

Source: JICA Survey Team

Based on the implementation schedule, the cash flow table of economic cost is prepared as shown in the following table. Details of economic cost are shown in Attachment 9.3.1.

Table 9.3.2 Disbursement Schedule of Economic Project Cost

Non-disclosure information

Source: JICA Survey Team

9.4 Operation & Maintenance (O&M) and Replacement Cost

(1) O&M Cost

Annual O&M cost is estimated as shown in the following table. Annual O&M cost is assumed as the total cost of electricity charge, operator salary and maintenance of solar panels based on situation of I. O&M cost will be required every year according to the schedule of infrastructure development. Details of the annual incremental O&M cost are shown in Attachment 9.3.1.

Table 9.4.1 Economic Annual O&M Cost

Non-disclosure information

Source: JICA Survey Team

(2) Replacement Cost

Non-disclosure information

Table 9.4.2 Economic Cost of Replacement

Non-disclosure information

Non-disclosure information

Source: JICA Survey Team

9.5 Project Economic Benefit

9.5.1 Benefit from Crop Diversification

The benefit from the Project is the increment of net production income derived mainly from the increment of cropping intensity and yield of vegetables as compared without and with project condition. Crop pattern intensity at Cultivable Command Area (CCA) in each ecological zone without project condition and with project condition is estimated as shown in the following table.

Table 9.5.1 Estimated Cropping Intensity at CCA

Non-disclosure information

Source: JICA Survey Team

Cropping intensity without project condition is estimated based on the result of sample survey conducted in the survey. The intensity of cereals with project condition is assumed less than without project condition so that the yield of without project condition could be kept under with project condition due to the increment of cereals' yield of with project condition. The intensity of vegetables is assumed to be the total amount of area of without project condition and the decreased portion of cereals.

9.5.2 Crop Budget

Economic crop budgets of cereals and vegetables with and without project conditions have been prepared for estimation of the benefits considering the current situation of agriculture in the project area and the following conditions.

- (i) Crop budget is prepared for the Rabi season and the Kharif season as shown in Table 9.5.2;
- (ii) Back data of crop budget is basically provided by the Project Management Unit (PMU) of HPCDP I along with the following sources:
 - Baseline survey and the survey for DPR conducted by PMU of HPCDP I
 - Statistical data of vegetable production, DOA
 - Statistical data of wholesale price, Directorate of Marketing & Inspection, Ministry of Agriculture and Farmers Welfare, disseminated in the website of Agmarknet
 - Current information from interview with DoA and PMU of HPCDP I
- (iii) Back data of crop budget of traded crop (wheat, maize and paddy) are prepared from the data of trade statistics from the Export Import Data Bank, Department of Commerce.
- (iv) Costs of chemical fertiliser and pesticide/ chemicals are estimated based on the subsidy and goods and services tax (GST); and
- (v) Crop budgets are converted to economic prices based on abovementioned financial prices with use of conversion factors.

Crop budget for major crops is varied due to the variation of unit yield of zone wise. Summary table of crop budget is presented in Table 9.5.2. A detailed table of the crop budget including unit yield is shown in Attachment 9.5.1.

Table 9.5.2 Summary of Economic Crop Budget

Non-disclosure information

Source: JICA Survey Team based on DPR/ survey conducted by HPCDP, statistic data of DoA Directorate of Marketing & Inspection, Ministry of Agriculture and Farmers Welfare and , interview with DoA and HPCDP

9.5.3 Project Benefit

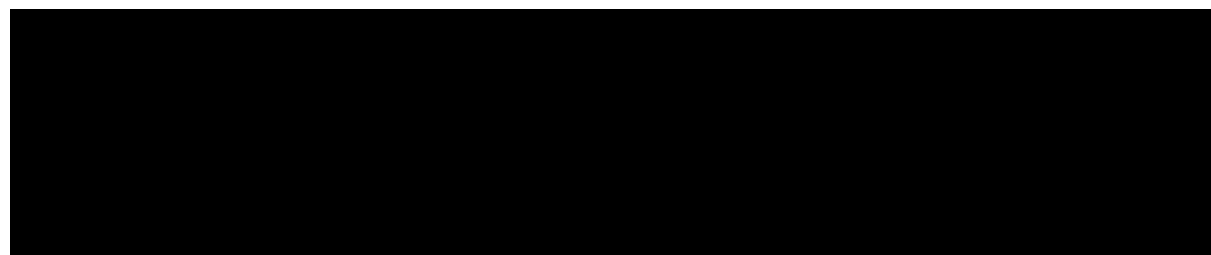


Table 9.5.3 Summary of Economic Benefit

Non-disclosure information

Source: JICA Survey Team

Table 9.5.4 Increase of Annual Benefit

Non-disclosure information

Source: JICA Survey Team

9.6 Result of Economic Evaluation

Based on the assumptions and conditions described so far, the indicators for economic evaluation are calculated as shown in the following table. The cash flow table for the calculation is shown in Attachment 9.6.1.

Table 9.6.1 Calculation Result of the Indicators for Economic Evaluation

Non-disclosure information

Source: JICA Survey Team

Table 9.6.2 Result of Sensitivity Analysis

Non-disclosure information

Source: JICA Survey Team

As these results, the indicators can be kept at a feasible level to implement the project and the project can stand for unexpected adverse changes. Therefore, the proposed project is concluded to be economically feasible.

9.7 Farm Economic Analysis

In order to evaluate the financial viability of individual farmers in the project area, annual farm income of average farm household is estimated based on the crop budget. Net farm income estimation of each ecological zone is shown in the following table and details are shown in Attachment 9.7.1.

Table 9.7.1 Farm Economic Analysis

Non-disclosure information

Source: JICA Survey Team

Cultivated area of average farm household is considered at 0.30 ha approximately from the result of sample survey conducted by the JICA Survey Team. The abovementioned analysis has showed the net farm income after implementation of the Project will increase at least by INR 21,000 per year compared with the current condition. In case of Zone-4, the area is not cultivated in the Rabi season due to snow issue during the winter season.

This result showed that the Project has a positive impact increasing the net farm income for an individual farmer.

9.8 Intangible Benefit

The following positive effects as intangible benefits shall be envisaged through project activities.

(1) Increase of farm household income of 296 sub-projects

As abovementioned in Section 9.7, annual farm income of average farm household can be expected to increase under with project condition compared with under without project condition, namely, current condition. For the increase of farm household income, the farmers supported by the Project will apply the cropping patterns, in which vegetables intensity would be increased based on market needs, and achieve the improved yields of vegetables and cereals through various technical activities mainly under farmers support component.

(2) Increase of social and economic status of women

The Project will implement the following activities in order to create basic income for farm household to accelerate crop diversification: livelihood support activities under farmers support component such as formation and formalisation of Self Help Groups (SHGs), mushroom cultivation, rearing of honey bees, dairy farming, backyard poultry, service sector training, shiitake mushroom cultivation and on-farm of fish culture. These activities can also contribute to social and economic empowerment for women since it is expected for women to develop not only the capacity to earn money but also the ownership in a household level through these technical activities in a community basis.

(3) Improvement of nutrition status of farmer

The Project will newly support improvement of nutrition status for farmers based on the output of Phase II Project for Crop Diversification in Himachal Pradesh. The planned activities are dissemination of recipes using nutritious ingredients and promotion of school garden for nutrition improvement. It is expected that crop diversification can contribute to human health with nutritious recipes and awareness for school children.

9.9 Operation and Effect Indicators

To measure, monitor and evaluate the project effects, operation and effect indicators of the Project and their target values are set. The target year of the indicators is about two years after the completion of the

Project. The selected indicators have important relevance to the project objectives and components. The set indicators in principle are based on the “JICA Indicator Reference in Financial Assistance Projects, Evaluation Department, JICA, 2020”. The current data are estimated based on secondary data analysis and sampling survey result. Those should be revised based on the baseline survey result to be collected soon after the project implementation.

9.9.1 Operation Indicators

The following operation indicators are proposed for project monitoring and evaluation:

Table 9.9.1 Proposed Operation Indicators of the Project

Non-disclosure information

Remark: 1) No. of commercial vegetable farmers in 296 subprojects is 1,657 currently observed by PMU of HPCDP I. More 10 subprojects are added as supported sites by convergence activity, so No. of commercial vegetable farmers in 306 subprojects is assumed about 1,700.

Source: JICA Survey Team

As abovementioned based on the JICA Indicator Reference, there are indicators related to the direct output of the Project. It is important to evaluate whether the target development has been achieved. The Project is composed of four major components, namely: infrastructure development, farmers’ support component, value chain and marketing development component and institutional development component. The operation indicators proposed could evaluate outcomes of all four components comprehensively.

9.9.2 Effect Indicators

The following effect indicators are proposed for project monitoring and evaluation:

Table 9.9.2 Proposed Effect Indicators of the Project

Non-disclosure information

Source: JICA Survey Team

The effect indicator is an indicator that quantitatively measures the effect manifestation status of a project. In other word, as a result of the equipment/facilities (outputs) being developed in the project the operation indicator measures whether the outputs are properly operated and used while the effect index measures the effects that they have on the beneficiaries and target areas.

9.9.3 Monitoring Method and System for Operation and Effect Indicators

Data on the above operation and effect indicators need to be continuously monitored during and after the Project. It is proposed to have a monitoring method and system for each indicator, including specific data collection methods as shown in the following table.

Table 9.9.3 Monitoring Method and System for Operation and Effect Indicators

No.	Indicator	Monitoring Target	Responsible Organisation	Timing of Data Collection	Data Source
A. Operation Indicators					
1	Collection rate of water service fee in 306 subprojects	All Subprojects	BPMU	Once a year	Annual Report
2	Number of farmers cultivating vegetables in 306 subprojects	Sample Subprojects	BPMU	Once a year	Annual Report
3	Number of FPOs starting the business with private company	All FPOs	SPMU	Once a year (after establishment of FPO)	Interview survey
4	Number of DOA extension staff using materials provided by PMU in the whole state	Sample DDA office	SPMU	Once a year	Annual Report
B. Effect Indicators					
1	Yield of selected crop in 306 subprojects	Sample Subprojects	BPMU	Once a year	Annual Report
2	Cultivation area of vegetables in CCA in 306 subprojects	Sample Subprojects	BPMU	Once a year	Annual Report
3	Rate of shipping price of FPO to farm gate price of vegetables in 306 subprojects	All FPOs	SPMU	Once a year	Interview survey

Source: JICA Survey Team

This monitoring method and system will be finalised soon after starting the project activities by PMU. The system will be reviewed and updated with support of Project Management Consultant (PMC). Necessary costs are listed in the institutional development component along with baseline, mid-line and end-line survey.

9.10 Risk Management

The risks anticipated in the implementation of the project are discussed in this section.

9.10.1 Approach to Risk Management

“Risk” is defined as the possibility that an event will occur and adversely affect the achievement of an objective. According to the concept of risk management, risk is generally classified as the probability of occurrence and the impact (magnitude) of loss when it occurs. Based on the classification, treatments for risks shall be considered, such as avoidance, reduction (optimise, mitigation), sharing, retention, etc. The purpose of risk management is to identify potential problems before they occur.

In the Project, “loss” is considered to be a “decrease of development effect”. Factors to reduce the development effect are called risks, such as decrease of the project benefit, increase of project cost, unachieved development target of the project, project cancellation or suspension, and their multiple occurrence.

Treatment for risks is generally classified as follows:

Table 9.10.1 Treatment for Risks

Impact	Probability	
	High	Low
High	Avoidance of the risk (to avoid activity itself with the risk)	Sharing of the risk (to transfer the risk to others, e.g., insurance)
Low	Reduction of the risk (to reduce probability and impact of risk before occurring)	Retention of the risk (not to take action for the risk)

Source: JICA Survey Team

As mentioned above, the concept of risk management aims to treat critical and major risks based on the above categories, considering the costs associated with the treatment of risks. Risk identification and assessment shown below is done based on the concept of risk management.

9.10.2 Identification and Assessment of Risks

According to JICA's Risk Management Framework, risks of the project are identified and assessed in the following categories. The JICA's Risk Management Framework classifies the risks into 1) stakeholder risk, 2) executing agency risk, and 3) project risk. The identified major risks in each risk category and the assessment results are shown in the following table.

Table 9.10.2 Identification and Assessment of Major Risks of the Project

Major Risks	Risk Assessment	Risk Treatment
1. Stakeholder Risk		
Risk of the project cancellation or suspension resulting from the low commitment of the state of Himachal Pradesh Appraisal stage / Implementation stage	Probability: M Impact: H	1) To hold regular high-level policy meeting, Executive Committee to review and approve annual plan of operation and budgetary allocations at the timing of the next fiscal year's budget request. 2) To hold regular financial sanction meeting, Finance Committee to monitor and guide all the financial matters. 3) To monitor the policy trends of the central government of India and the position of the Project in the annual plan of the state of Himachal Pradesh.
2. Executing Agency Risk		
2.1 Capacity risk 1) Risk of decrease of benefit, increase of cost, unachieved development target and delay of the project resulting from the lack of technical capacity of DOA or delay in procurement of quality PMC to support PMU Appraisal stage / Implementation stage	Probability: M Impact: M	1) To support PMU by PMC experts for implementation of value chain and market development component. 2) To plan appropriate implementation structure for all of the components. Especially for value chain and market development component, proper executers such as service provider or local experts will be required in consideration of the lack of technical skill of PMU. 3) To give additional tasks to on-going Technical Cooperation Project funded by JICA to support PMU at the initial stage to fill the technical gap.
2) Risk of decrease of benefit, increase of cost, unachieved development target and delay of the project resulting from low project management capacity of DOA Appraisal stage / Implementation stage	Probability: L Impact: M	1) To hold Finance Committee regularly to monitor, evaluate and approve financial management and procurement. 2) To support PMU by PMC for application of the guideline and manuals on financial management and procurement.
3) Risk of decrease of benefit, increase of cost, unachieved development target and delay of the project resulting from low financial capacity of DOA Appraisal stage / Implementation stage	Probability: L Impact: M	1) To hold Finance Committee regularly to monitor, evaluate and approve financial management and procurement. 2) To support PMU by PMC for financial management
4) Risk of decrease of benefit, increase of cost, unachieved development target and delay of the project resulting from delay of payment to contractor Appraisal stage / Implementation stage	Probability: L Impact: M	1) To support PMU by PMC for monitoring the construction and payment progress 2) To hold Finance Committee regularly to monitor payment work progress.
2.2 Governance risk 1) Risk of delay of the project resulting from the improper communication of related organizations and the implementation structure. Appraisal stage / Implementation stage	Probability: L Impact: M	1) To clarify role, responsibility and relationship of each organization before starting the Project. 2) To hold Executive Committee regularly to share and discuss on the progress of the project activities with related organizations. 3) To implement institutional development component for DoA staff with support of PMC.

Major Risks	Risk Assessment	Risk Treatment
2) Risk of delay of the project implementation schedule from delay of procedure of E/N and L/A by the government Appraisal stage / Implementation stage	Probability: L Impact: M	1) To support HP state by JICA to arrange meetings and documents to achieve necessary procedure and approval punctually before project implementation.
2.3 Fraud & corruption risk Risk of increase of cost and unachieved development target, delay of the project resulting from fraud of procurement of the Project. Appraisal stage / Implementation stage	Probability: L Impact: M	1) To adopt procurement system prepared by HPCDP I with addition of necessary revision. 2) To monitor proper procurement work through Finance Committee.
3. Project Risk		
3.1 Design risk 1) Risk of delay in the implementation of the Project from the design with too advanced techniques. Appraisal stage / Implementation stage	Probability: M Impact: M	1) To appoint PMC to support PMU to conduct project components especially for value chain and market development component.
2) Risk of unachieved development component in the project implementation from improper project scope and project monitoring system. Appraisal stage / Implementation stage	Probability: L Impact: M	1) To plan proper project components before the Project 2) To hold monthly progress meeting by SPMU, DPMU and BPMU to monitor and share the progress of activities based on three-layer plans 3) To hold Executive Committee to monitor the progress of project components.
3) Risk of delay of the project implementation schedule from too many number of packages Appraisal stage / Implementation stage	Probability: L Impact: M	1) To review the DPR based on the results of HPCDP I before the Project. 2) To confirm local situation about constructor's capacity and the quality control before the Project.
4) Risk of cancellation or suspension of the project implementation from increase of project cost Appraisal stage / Implementation stage	Probability: L Impact: M	1) To consider the project cost based on economic situation of country and target area before the Project.
5) Risk of decrease of benefit of the project implementation from sudden decrease of market demand of vegetables due to external factors. Appraisal stage / Implementation stage	Probability: L Impact: L	1) To conduct the project economic analysis and confirm the resiliency against demand (benefit) decrease before the Project.
3.2 Program/donor risk Risk of decrease of benefit and delay of the project resulting from delay of the other schemes, other donors' projects or departments conducted in HP state. Appraisal stage / Implementation stage	Probability: L Impact: L	1) To hold information exchange meeting and project coordination meeting with relevant organizations periodically by PMU supported by PMC
3.3 Delivery quality risk 1) Risk of impossibility to monitor and measure development effect due to lack of the way of data collection. Appraisal stage / Implementation stage	Probability: L Impact: L	1) To support PMU by PMC to collect data properly. 2) To establish MIS & GIS facilities and provide technical support including O&M to PMU with support of PMC

Major Risks	Risk Assessment	Risk Treatment
2) Risk of unsecured sustainability for O&M of project resulting Appraisal stage / Implementation stage	Probability: M Impact: M	1) To support PMU by PMC to establish KVA in accordance with the criteria including the importance of responsibility. 2) To conduct O&M training to KVA with support of PMC.
3) Risk of decrease of benefit, increase of cost, unachieved development target and delay of the project resulting from natural disaster Appraisal stage / Implementation stage	Probability: M Impact: L	1) To plan construction work schedule to be conducted in Rabi season. 2) To plan and conduct project components in consideration of climate condition with support of PMC.
4) Risk of unfair benefit expression of the project resulting for the limited beneficiaries Appraisal stage / Implementation stage	Probability: L Impact: L	1) To support PMU by PMC to formulate SHG properly. 2) To conduct livelihood improvement activities for SHG with support of PMC/ local expert/ relevant departments.

Remark: H: High, M: Middle, L: Low
Source: JICA Survey Team

The result of the risk identification and assessment is also shown in Attachment 9.10.1 in the form specified by JICA (Risk Management Framework).

9.11 Adaptation Measures for Climate Change

9.11.1 NDC and Adaptation in India

(1) NDC and Present Achievement in India

NDC (Nationally Determined Contributions) committed by India are mainly (a) to reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level and (b) to achieve about 40% cumulative electric power from non-fossil fuel energy resources by 2030 in order to better adapt to climate change by enhancing investments in sectors vulnerable to climate change, particularly agriculture and water resources.

India has so far made good progress towards meeting its Paris Agreement targets. India's emission intensity has reduced by 21% over the period 2005-2014 and by 2030, India's emission intensity is projected to be even lower as 35 to 50%. India's non-fossil fuel electricity capacity, which includes renewables, large hydro, and nuclear, was 38% of its total installed electricity mix, as of September 2019, remains just 2% its 2030 target. Adaptation to climate change by enhancing investment in agriculture sector vulnerable to climate change is still seeking the enhancement. India has National and State Action Plans on Climate Change and tackling on enhancement of adaptation to climate change. However, finance has been a critical enabler of adaptation to climate change, and technology transfer is also necessary to achieve the targets.

(2) Contribution of the Project for the Adaptation

JICA has developed "JICA Climate Finance Impact Tool for Adaptation" to implement standardized assessments of climate risks and adaptation plans in various JICA projects. The tool explains climate risks in agriculture sector as follows.

"Growth of agricultural crops requires a specific temperature or more depending on cultivars and varieties, and if the temperature is too high, the growth rate may be reduced. In general, there is an optimum temperature at which the growth rate is greatest for each crop, and the change in temperature due to climate change may become an inappropriate environment for crops. In addition, since the moisture, temperature, and the like required for each stage of crop growth (germination, flowering, enlargement, etc.) differ, the change in the growth environment of crops due to climate change may ultimately affect the productivity and quality of the crop. In addition to crops themselves, climate change may also change the outbreak of pests by promoting the growth of weeds that inhibit crop growth and

by changing the growth environment for pests. This change in climate could have a variety of impacts on agriculture and food production.”

The tool lists adaptation measures against the above risks. Several activities of HPCDP-II are included in the list and the main measures are shown below.

Table 9.11.1 Adaptation Option and Expected Effect

Adaptation Option	Expected Effect
Crop diversification	Some crops can grow during climate change and becomes alternative livelihood.
Improvement of irrigation system	Water is stably supplied regardless of rainwater amount and save water use.
Early warning information mechanism	Farmers are able to take measures such as adequate use of agricultural chemical, harvesting before natural disaster, etc.
Catchment area treatment	Catchment area treatment prevents destruction of the irrigation facilities and slope surrounding fields and assures farmer’s safety.
Improvement of marketing	Income from diversified crops becomes stable.
Capacity development	Farmers are able to deal with natural disasters and abnormal weather.

Source: JICA Survey Team

Thus, the Project comes into alignment with NDC in India.

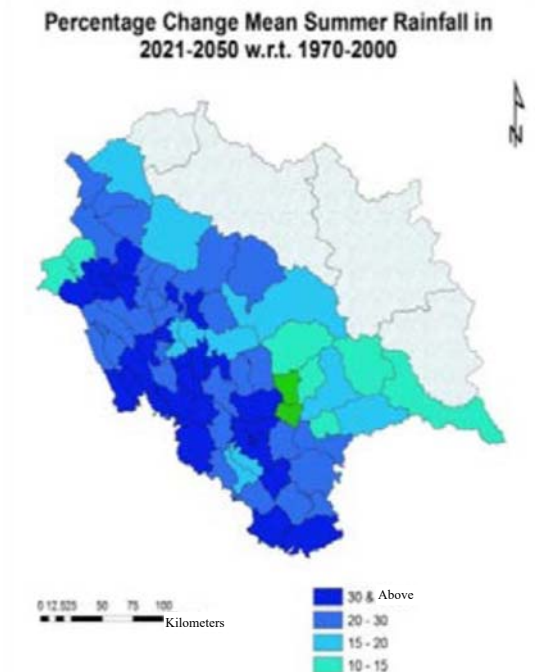
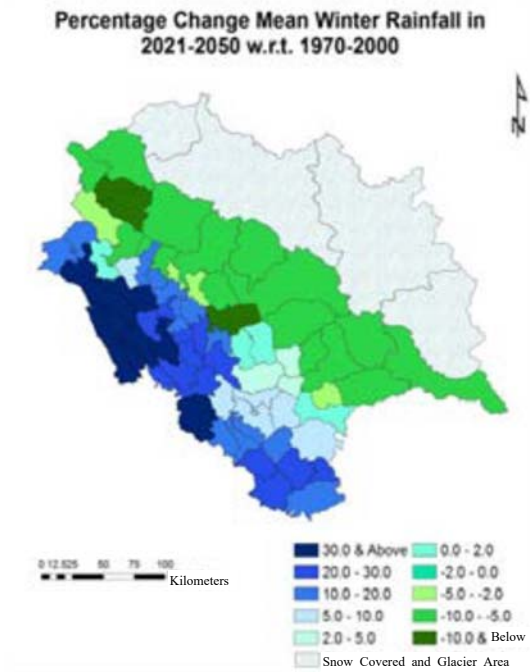
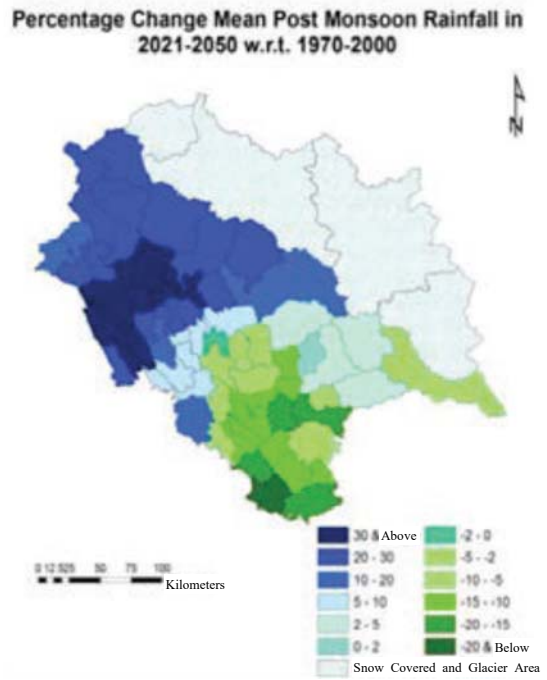
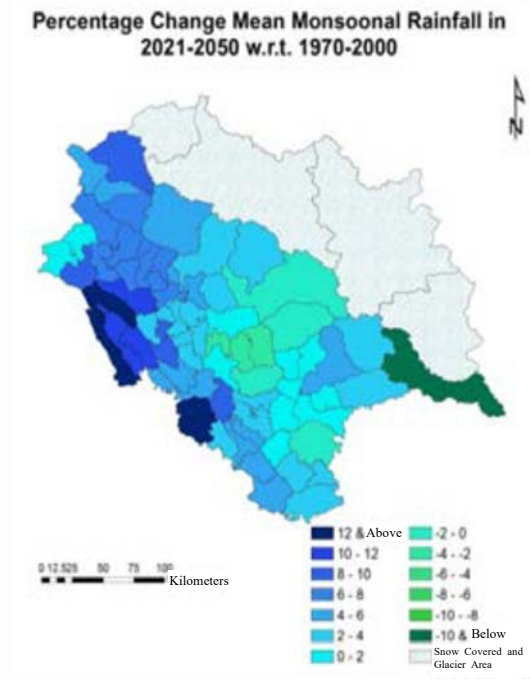
9.11.2 Climate Change Impact

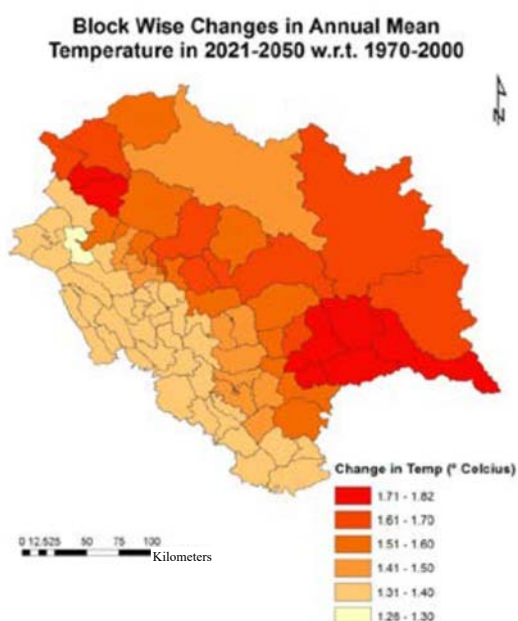
Mountain ecosystems, including Himachal Pradesh, are more vulnerable to global warming than other ecosystems, with significant fluctuations in mountain temperature, rainfall and other meteorological parameters over the last few decades.

Climate Modelling for Himachal Pradesh examined by Himachal Pradesh Knowledge Cell on Climate Change (HPKCCC) provides an analysis and evaluation of observed climatological information of Himachal Pradesh and assessment of near future climate variability over the state. Analyses methods include review of literature, obtaining the observed climatological data for the state and its trend analyses. Analysis was carried out based on climate change scenario of A1B of SRES and PRECIS model, HadCM3, was used.

Spatial variation is seen for precipitation projections in the near future for different seasons as shown in the following figures. Winter months show the largest change in the probable ranges for the future and summer season shows an overall increase over the state in the future. The snow and glacier areas have not been taken into block-wise analysis plots for rainfall. The imbalance of the rainfall will occur and it causes imbalance of water resources.

Analyses of extreme climate conditions were also performed. Annual mean temperature projected to increase by 1.3-1.9 °C for 2021-2050 period relative to 1971-2000.





Source: Climate Modelling for Himachal Pradesh examined by Himachal Pradesh Knowledge Cell on Climate Change (HPKCCC)

Figure 9.11.1 Spatial Variation of Rainfall and Temperature as a Result of Climate Modelling

9.11.3 Adaption Measures for Climate Change

There is an optimum temperature at the growth rate of agriculture crops and the change in temperature due to climate change may become an inappropriate environment for crops. Since the required moisture and temperature for each stage of crop growth (germination, flowering, enlargement, etc.) differ, the change in the growth environment of crops due to climate change may ultimately affect the productivity and quality of the crop. In addition, climate change may also change the outbreak of pests by promoting the growth of weeds that inhibit crop growth and by changing the growth environment for pests. This change in climate could have a variety of impacts on agriculture and food production. Under agriculture sector, JICA Climate Finance Impact Tool for Adaptation (2019) proposes eight categories of items namely (1) policy and legislation, (2) climate change program, (3) capacity building and implementation structure, (4) social aspect, (5) financial and market, (6) farming techniques, (7) water management and infrastructure and (8) soil management as an adaptation options. Considering those adaptation options and the results of interviews with DoA, following climate hazards and the adaptation measures are being considered in HP state and project implementation.

Table 9.11.2 Adaption Measures for Climate Change

Climate Hazard	Risks	Adaptation Measures (Reply from DOA)	Supported / Not Supported by HPCDPP (2)
			◎ : Directly supported △ : Indirectly supported × : Not supported
Rising temperature Changes in rainfall	Insufficient irrigation water due to poor water balance in the region Rising temperatures and changes in precipitation may cause deviations from the growing conditions of existing varieties. It reduces the productivity and profitability of current crop varieties.	Diversification from apple-based agriculture to pears, pomegranates, kiwis, etc., and conversion to commercial vegetable cultivation	△ Although it does not directly support the conversion of apple farmers to vegetable cultivation, it can be expected to contribute to the conversion of apple farmers to crops in the future by exhibiting commercial vegetable cultivation techniques.
		Reduction of firewood use by using biogas power generation, protection of forests	△ Although biogas is not promoted directly, it can contribute to soil erosion control and forest protection through the construction of a catchment area treatment facility.
		Verification and introduction of suitable varieties	◎ The introduction and distribution of high-quality suitable varieties will be carried out through R&D support jointly implemented with the State

Climate Hazard	Risks	Adaptation Measures (Reply from DOA)	Supported / Not Supported by HPCDPP (2) ◎ : Directly supported △ : Indirectly supported × : Not supported
			Agriculture University.
		Promotion of protected agriculture	◎ Introduce a greenhouse and promote protected agriculture that is not affected by climate change.
		Introduction of traditional crops or cultivation methods	◎ For subsistence farmers, it is expected to promote low-input farming that incorporates natural farming, which is consistent with the use of traditional methods. It may also encourage the consumption of nutritious traditional crops through nutritional improvement activities.
		Improvement of irrigation facilities and promotion of water-saving irrigation	◎ It is planned to improve irrigation and introduced water-saving irrigation kits in 306 locations
		Organise information using GIS and respond quickly	◎ It is planned to manage irrigation scheme information by introducing MIS.

Source: JICA Survey Team based on the interview survey with DoA

The melting of glaciers due to climate change has become a major issue in HP. However its impact is limited in small-scale irrigation projects in small watersheds under the jurisdiction of DOA. In addition, according to the interview with DOA, although the damage to the irrigation facilities due to the flood has been reported, there is no report that the damage is increasing year by year, and the damage caused by climate change is not found at present.

Chapter 10 Environmental and Social Considerations

10.1 Legal Framework and Institutional Arrangement of Environmental and Social Considerations in India and Himachal Pradesh State

India has a strong legal policy and operative framework for the protection of environment and conservation of ecological resources. The policies of the nation are in conformity to the management of natural resources for sustainable development. Article 48A in the Constitution of India 1949 mandates that “State shall endeavour to protect and improve the environment and safeguard the forests and wildlife”. Similarly, Article 51A defines the fundamental duties of every citizen and one of them is “to protect and improve the natural environment”.

In line with the Japan International Cooperation Agency (JICA) Guidelines for Environmental and Social Considerations (April 2010), this section reviews and analyses the policies, laws, and regulations of relevant Environmental and Social Consideration (ESC) with respect to the Project whether these fully respond to the requirement of the JICA Guidelines as well as The World Bank’s Safeguard Policies, which provided the foundation for this guidelines.

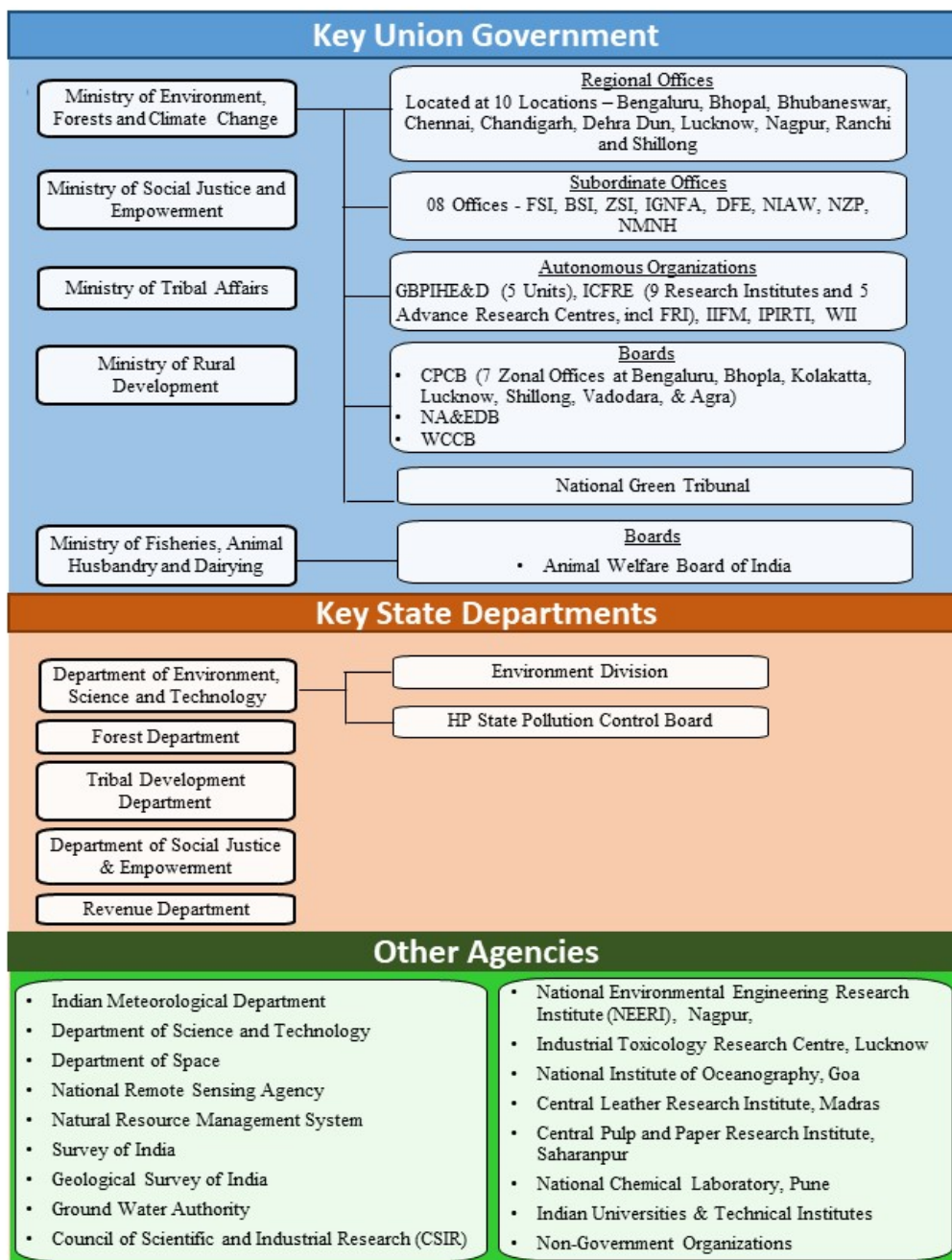
10.1.1 Major State Level Laws, Regulations Relevant to Environmental and Social Considerations

Apart from the national level laws/policies, Himachal Pradesh State has formulated its own laws, rules, regulations, notifications, guidelines, policies and standards with respect to different aspects of ESC that ensure consistency with key relevant national laws and regulations. The important and relevant state level legal frameworks applicable for ESC in relation to the Project, namely, environment protection and environmental impact assessment (EIA), prevention and control of pollution, and land acquisition and involuntary resettlement are outlined in Attachment 10.1.1. In addition, as the subprojects¹ will involve the contractors to work in designated areas for infrastructure development of micro-irrigation schemes, labour laws that might be pertinent under the proposed Project are applied.

10.1.2 Institutions Relevant to Environmental and Social Considerations

There are a number of ministries, departments, institutions, autonomous bodies and agencies that are involved in environmental management, monitoring and surveillance within the country. The Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India (GoI) is the apex body and central ministry in the country in-charge of regulating and ensuring environmental protection including planning, promotion, coordination and supervision of environmental policy/programme for implementation. The Central Pollution Control Board (CPCB) under MoEF&CC at the union level and the State Pollution Control Boards (SPCB) at the state level together form the regulatory and administrative core of this sector, which are mainly responsible to periodically monitor pollution levels. Figure 10.1.1 provides an overview of the major institutions involved in ESC in the country.

¹ In this Project, “Sub-project” is a minor irrigation scheme which shall be screened, selected and approved by SPMU for implementation following the requirement of environmental and social safeguards.



Legend

- FSI - Forest Survey of India,
- BSI - Botanical Survey of India,
- ZSI - Zoological Survey of India,
- IGNFA - Indra Gandhi National Forest Academy,
- DFE - Directorate of Forest Education,
- NIAW - National Institute of Animal Welfare,
- NZP - National Zoological Park,
- NMNH - National Museum of Natural History
- GBPIHE&D - Govind Ballabh Pant Institute of Himalayan Environment & Development
- ICFRE - Indian Council of Forestry Research and Education
- IIFM - Indian Institute of Forest Management
- IPIRTI - Indian Plywood Industries Research and Training Institute
- WII - Wildlife Institute of India
- AWBI - Animal Welfare Board of India
- CPCB - Central Pollution Control Board
- NAEDB - National Afforestation and Eco-Development Board
- WCCB - Wildlife Crime Control Bureau

Source: JICA Survey Team based on the existing information

Figure 10.1.1 Major Institutions Involved in Environmental and Social Considerations

10.2 Environmental Clearance

Environmental clearance (EC) of new projects in India is subject to the EIA Notification, 2006 that became effective from 14th September 2006. This notification is applicable to all states. The Ministry of Environment, Forest and Climate Change (MoEF&CC) has published the draft EIA Notification 2020,

with the intention of replacing the existing EIA Notification, 2006 under the Environment (Protection) Act, 1986.

10.2.1 Environmental Impact Assessment

In 1994, the EIA Notification, under the Environmental (Protection) Act (1986), was issued, which made the process of EIA a “statutory requirement” rather than an “administrative requirement” for a number of projects/activities that are likely to have significant environmental impacts and health implications. Thereafter, the EIA Notification has undergone several amendments, whereby, the provisions for conducting “public hearing” has been incorporated, and several important projects/activities have been brought into the ambit of EIA, thus requiring an “Environmental Clearance” by MoEF&CC. The EIA Notification 2006 and subsequently the draft EIA Notification 2020 were issued with further improvements in the EIA procedure. Further, an effort has also been made to make the EIA procedure more transparent and to provide societal vigil of projects affecting the environment through “public hearing/consultation” by moving the environment protection agenda into public domain. In the draft notification (2020), revised “threshold criteria” were introduced for different categories of projects.

In this section, the processes adopted in India and the requirement for EC is described although the Project is not anticipated to require any environmental clearances.

10.2.2 EIA System and Requirements

Projects/ developmental activities have been divided into eight major categories that require EC either from the central government (MoEF&CC) or at the state level from the State Environmental Impact Assessment Authority (SEIAA). The categories with thresholds for the subprojects or activities requiring prior EC are described in Attachment 10.2.1.

All projects and activities are broadly categorised into two types, namely: Category A and Category B subdivided into B1 and B2, based on the size/scale of the concerned projects as well as spatial extent of potential impacts and potential impacts on human health and natural and man-made resources. The detailed stages prior to EC are highlighted below.

Category ‘A’ projects or development activities are mandated to conduct EIA studies along with conducting “Public Consultation” as per the procedure stipulated in the notification and EC is required from the central government or MoEF&CC.

For Category ‘B’ projects, screening is under the purview of the State Expert Appraisal Committee (SEAC) and the State Level Environmental Impact Assessment Authority (SEIAA) / Union Territory Level Environmental Impact Assessment Authority (UTEIAA) committee for decentralised procedure of EC. Further Category ‘B’ projects are divided into Category ‘B1’ and ‘B2’.

Under Category ‘B1’ there are two sub-types of projects:

- (a) ‘B1’ projects that excludes areas defined under ‘General Conditions’ shall require prior-EC from SEIAA or UTEIAA, as the case may be.
- (b) ‘B1’ projects that includes areas defined under ‘General Conditions’ shall require prior-EC from the MoEF&CC without any changes in the category of the project.

Category ‘B2’ projects fall under the purview of the SEIAA or UTEIAA and do not require EIA. For ‘B2’ projects that are required to be placed before the Appraisal Committee shall require prior-Environmental Clearance (EC) from SEIAA or UTEIAA whereas, the rest of B2’ category projects shall require prior-Environmental Permission (EP) from SEIAA or UTEIAA and shall not be placed before the Appraisal Committee.

10.2.3 Stages and Procedure to Obtain Environmental Clearance

The stages in EC procedure as per EIA Notification 2006 and draft EIA Notification 2020 are described in the following Table 10.2.1 and Figure 10.2.1. For convenience, stages of EIA have been divided into six stages in this report, i.e.; 1) Screening, 2) Scoping, 3) EIA Study, 4) Public Consultation, 5) Appraisal, and 6) Monitoring. For details of the stages for EC as per the draft EIA Notification 2020 refer to Attachment 10.2.2.

The process of application for EC is given in Table 10.2.2. As part of transparency, all state-wise details of EC application, public hearing details for upcoming and approved Terms of Reference (ToR) are updated on the website of MoEF&CC.

Table 10.2.1 Stages in EC Procedure as per EIA Notification 2006 and Draft EIA Notification 2020

Stages in EIA	Project Proponent	IAA/ MoEF&CC	Consultant	SPCB	Public/ NGO
1. Screening	Decides the type of project after guidance by a consultant	Provides site clearance, if required	Guides the proponent in the initial screening	Provides site clearance	Not involved
2. Scoping	Provides the Terms of Reference (optional)	Provides guidance if proponent requires	Establish if an EIA study is required	Not involved	Not involved
3. EIA Study 3.1. EIA Studies	Conduct EIA studies	Not involved	Conduct EIA studies	Not involved	Not involved
3.2 EIA Report	Submit EIA report to SPCB	Not involved	Assist the proponent	Arrange for public hearing	Have access to Executive Summary
4. Public Consultation	Obligated to respond to issues raised during the hearing	Not involved	Assist the proponent	Hold the public hearing and forward No Objection Certificate (NOC) and Minutes to	Can provide oral/ written comments
5. Appraisal	Submit EIA report to MoEF&CC	Reviews the project and accords clearance	Clarify queries from MoEF & CC	Not involved	Not involved
6. Monitoring	To adhere to the clearance conditions	To monitor progress	To assist the proponent	To monitor progress	Not involved

Note: IAA = Impact Assessment Authority; SPCB = State Pollution Control Board; NGO = Non-governmental Organisation NOC = Non Objection Certificate

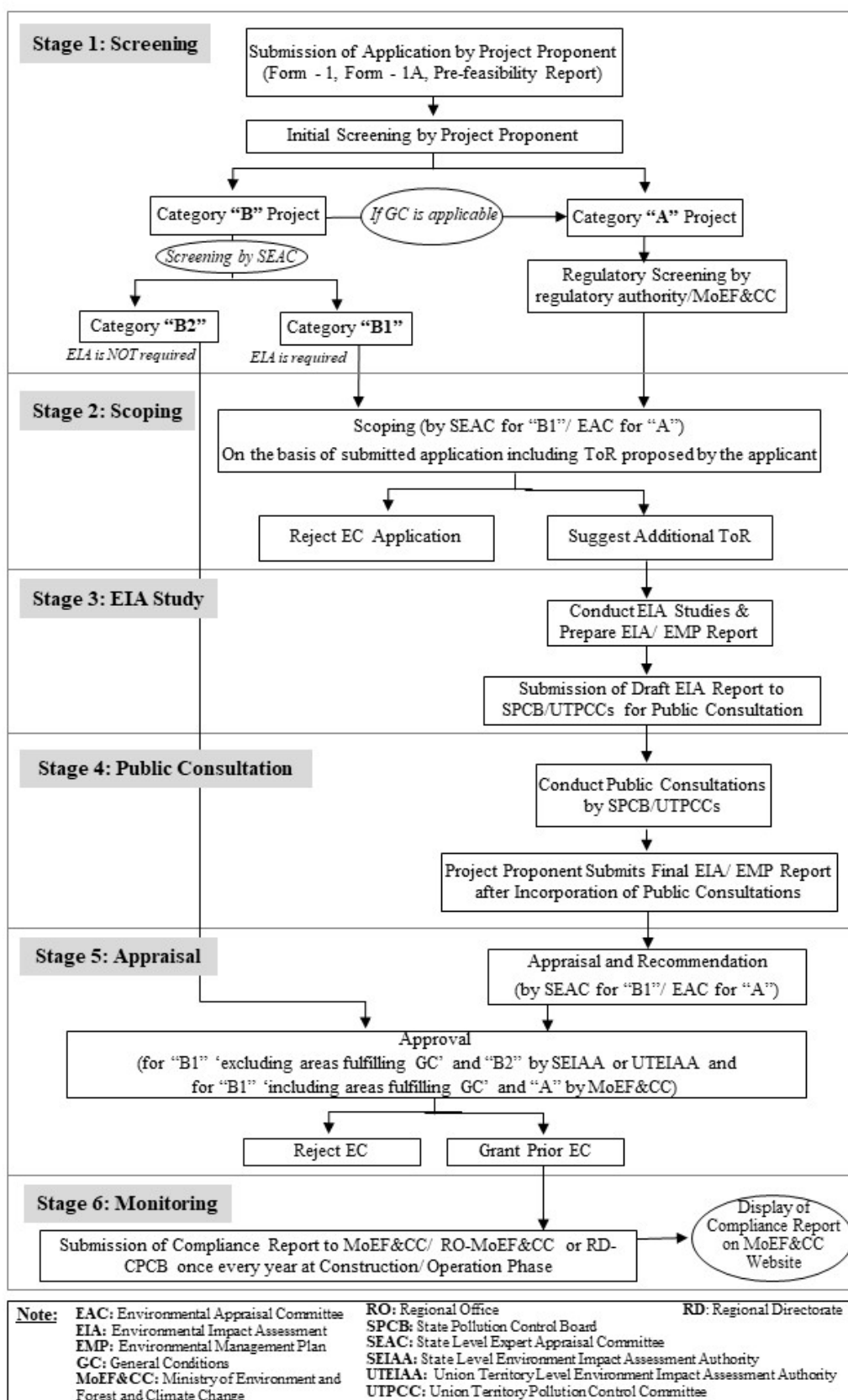
Source: JICA Survey Team based on information from http://shodhganga.inflibnet.ac.in/bitstream/10603/25724/11/11_chapter_03.pdf

Table 10.2.2 Process of Application for EC as per the Draft EIA Notification 2020

Stage	Forms	Supplemented with	Applicability	Regularity Authority
Scoping	Form-1	Pre-feasibility report	All projects under Category 'A' and Category 'B1'.	Ministry: For the projects under Category 'A' and Category 'B1' (those which attract the General Conditions); and SEIAA or UTEIAA, as the case may be: For the projects under Category 'B1' (those which do not attract the General Conditions) and Category 'B2'.
Public consultation	Simple letter addressed	(i) At least ten hard copies and a soft (electronic) copy of the Draft EIA Report prepared in English; and (ii) At least ten hard copies of summary of EIA Report in English and in the official language of the State or Union Territory or Regional language	All projects as given in subclause (1) of Clause 14 of this notification	Member Secretary of SPCB / UTPCC concerned.
Appraisal	Form-1	(i) Form-1A; and (ii) Conceptual Plan	All projects mentioned at column (5) under items 42 and 43 of the schedule.	SEIAA or UTEIAA, as the case may be

Stage	Forms	Supplemented with	Applicability	Regularity Authority
	Form-1	(i) Form-1B2; (ii) EMP; (iii) Final Layout Plan; (iv) Feasibility Report or Mining Plan in case of mining projects; (v) District Survey Report in case of mining of minor minerals; and (vi) Cluster Certificate in case of cluster situation.	All projects falling under Category 'B2'.	SEIAA or UTEIAA, as the case may be.
	Form-2	(i) Final EIA Report; (ii) Copy of Feasibility Report or Approved Mining Plan in case of mining projects; (iii) Copy of final layout plan; (iv) Public consultation proceedings; (v) District Survey Report in case of mining of minor minerals; and (vi) Cluster Certificate in case of cluster situation; and (vii) Certificate of Compliance of Conditions earlier prior-EC or prior-EP, as the case may be, issued by the Component Authority in case of expansion or modernisation proposals; and (viii) Other prerequisites as specified at sub-paragraph (5) of paragraph 17 of this notification.	All projects falling under Category 'A' or Category 'B1'.	Ministry: For the projects under Category 'A' and Category 'B1' (those which attract the General Conditions); SEIAA or UTEIAA, as the case may be: For the projects under Category 'B1' (those which do not attract the General Conditions) and Category 'B2'

Source: Based on Draft EIA Notification (No. S.O.750(E) dated 17th February 2020) of MoEF & CC



Source: JICA Survey Team based on information from EIA Notification 2006 and draft 2020
Figure 10.2.1 Stages in the Environmental Clearance Procedure as per Draft EIA Notification 2020

10.2.4 Agriculture Area and Irrigation Sector Projects Requiring Prior Environmental Clearance

As per draft EIA Notification 2020, the list of projects related to agriculture area and irrigation requiring prior-Environmental Clearance is listed in Table 10.2.3. The table describes the category of the projects and the threshold limits specified for areas related to agriculture and irrigation sector.

Table 10.2.3 List of Projects Related to Agriculture and Irrigation Requiring Prior-Environment Clearance

Project		Category with Threshold Limit			Remarks
		A	B1	B2	
4	Irrigation	≥ 50,000 hectares of culturable command area	>10,000 hectares and	> 2000 hectares and < 10,000 hectares of culturable command area.	
19	Chemical fertilisers and standalone ammonia plants.	(i) All projects except single super phosphate including sulphuric acid. (ii) Standalone ammonia plants	Single super phosphate including sulphuric acid production.	-	
21	Pesticides including insecticides; herbicides; weedicides; pest control; etc., and their specific intermediates (excluding formulations)	All projects located outside the notified industrial estates.	All projects located within the notified industrial estates.	-	
42	Building construction and area development projects	-	>1,500,000 m ² of built-up area and or total land area of > 50 hectares	(i) >20,000 m ² and 50,000 m ² of built-up area (ii) > 50,000 m ² and < 1,50,000 m ² of built-up area projects having provisional 'certificate of green building' or relating to industrial sheds, educational institutions, hospitals and hostels for educational institutions	Note 1. Projects under (i) and (ii) of Column (5) shall not be referred to the Appraisal Committee. 2. Any change in the intended use, prior permission from the Regulatory Authority for amendment in the prior-EP shall be obtained. All such cases shall be referred to the Appraisal Committee.
				> 50,000 m ² and < 1, 50,000 m ² of built-up area	Note: Projects under Column (5) shall be referred to the Appraisal Committee

Source: Based on the Draft EIA Notification (No. S.O.750(E) dated 17th February 2020) of MoEF&CC

As part of the draft EIA 2020, the irrigation projects with >2,000 CCA are required prior-environmental clearance. As the proposed activities under the project are all part of minor irrigation schemes with < 100 CCA, thus prior environmental clearance is not required.

10.2.5 Land Acquisition, Rehabilitation and Settlement

Until 2013, GoI and the states were following the Land Acquisition Act, 1894. In the year 2007, GoI introduced the National Rehabilitation and Resettlement Policy. In November 2013, 'The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act' was passed by the Parliament. The 2013 Act brought in several key changes to the process of land acquisition in the country.

Firstly, it increased the compensation provided to landowners, from 1.3 times the price of land to 2 times the price of land in urban areas, and 2-4 times the price of land in rural areas.

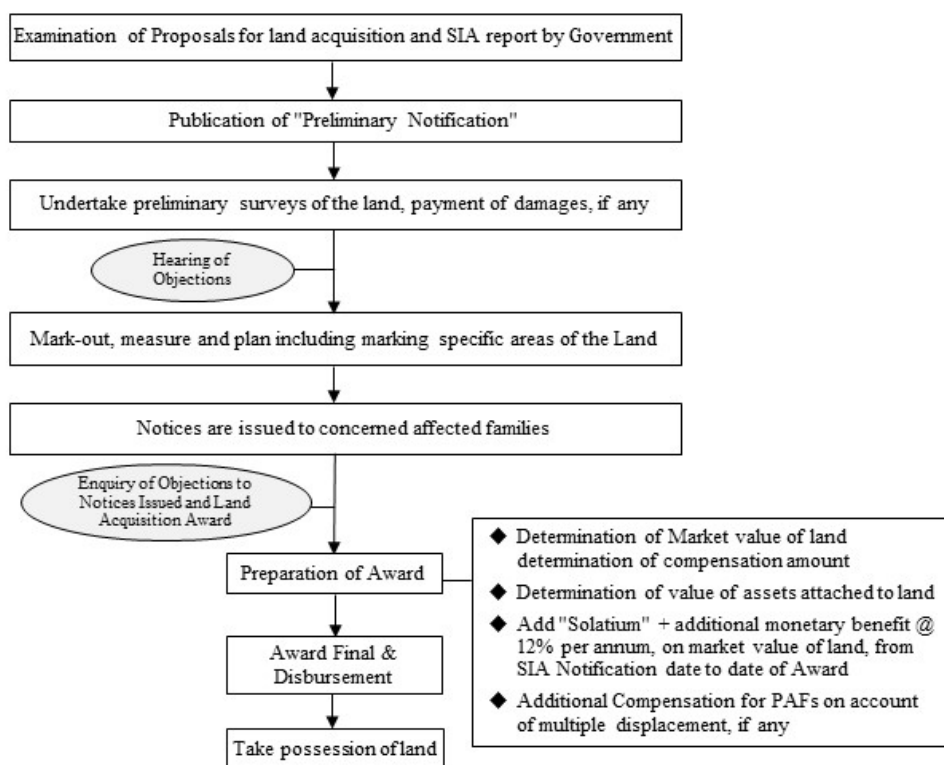
Secondly, unlike the earlier act, which did not provide rehabilitation and resettlement (R&R), the 2013 Act provided R&R to landowners as well as to those families which did not own land, but were dependent on the land for their livelihood. The act permits states to provide higher compensation and R&R.

Thirdly, unlike the previous act, it mandated that a Social Impact Assessment (SIA) be conducted for all projects, except for those land that are required urgently. An SIA assesses certain aspects of the acquisition such as whether the project serves a public purpose, whether the minimum area that is required is being acquired and the social impact of the acquisition.

Fourthly, it also mandated that the consent of 80% of landowners be obtained for private projects and the consent of 70% of landowners be obtained for public-private partnership projects. However, consent of landowners is not required for government projects.

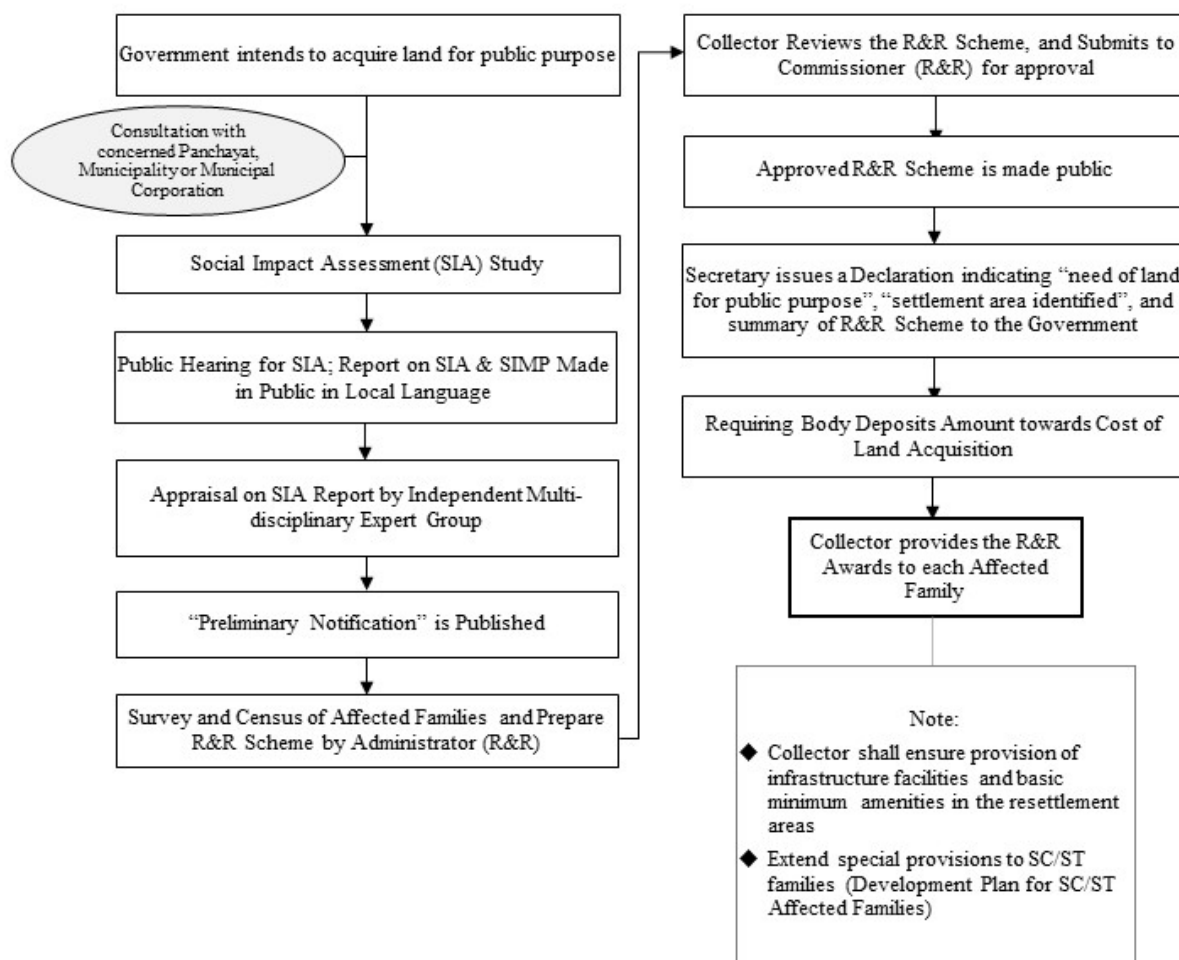
On 3rd April 2015, the bill exempted five categories of projects, namely: (i) defence, (ii) rural infrastructure, (iii) affordable housing, (iv) industrial corridors (set up by the government/government undertakings, up to 1 km on either side of the road/railway) and (v) infrastructure projects, from this provision of the 2013 Act. The bill also allows the government to exempt these five categories of projects from: (i) the requirement of a Social Impact Assessment and (ii) the limits that apply for acquisition of irrigated multi-cropped land, through issuing a notification.

The processes involved in land acquisition and involuntary resettlement are depicted in Figure 10.2.2 and Figure 10.2.3.



Source: JICA Survey Team based on information from RFCTLARR Act 2013 and subsequent rules

Figure 10.2.2 Process of Land Acquisition



Source: JICA Survey Team based on information from RFCTLARR Act 2013 and subsequent rules

Figure 10.2.3 Process of Resettlement and Rehabilitation

Under the project for development of minor irrigation scheme, the required infrastructure will be developed in the private farmland/ community land, thus written consent from the willing individuals shall be taken up for voluntary donation. Since the size and scale of the minor irrigation scheme under the project would be very small, no resettlement and rehabilitation are required.

10.3 Environmental and Social Conditions

Baseline information pertaining to social and environmental conditions is very important to understand the perceived impact that the project activities might have on the local environment. The importance attached to baseline information does not depend whether there will be any negative impact on the environment due to project and its activities or not, also even whether EIA is required or not. Thus, some key baseline data pertaining to social and natural environment are represented in the subsequent sections.

10.3.1 Social Environment

This section describes the i) details of the socio-economic conditions and cultural perspectives of scheduled tribes (STs) in the state and ii) list of the remaining villages under the jurisdictional area of national parks and wildlife sanctuaries in the state.

(1) Scheduled Tribes

The term "Scheduled Tribes" first appeared in Article 366 (25) of the Constitution of India, which defined scheduled tribes as "such tribes or tribal communities or parts of or groups within such tribes or tribal communities as are deemed under Article 342 to be Scheduled Tribes for the purposes of this Constitution". The criteria followed for specification of a community, as scheduled tribes are indications

of primitive traits, distinctive culture, geographical isolation, shyness of contact with the community at large and backwardness. The criteria are not spelt out in the Constitution but become well established.

a. Population and Distribution: STs accounted for 5.71% of the total population in the state and the GoI has notified eight tribal groups of Himachal Pradesh State as STs (The Constitution (Scheduled Tribes) Order 1950 (C.O.22), dated 6-9-1950). The STs of Himachal Pradesh State live in the most inaccessible places, mountains and jungles, in the districts of Chamba, Kinnaur, Kangra, Mandi, Bilaspur, Mahasu, Sirmaur and Lahaul-Spiti. They are the minority in some districts, such as Mandi, Sirmaur and Bilaspur, whereas they are the majority in the districts of Chamba, Kinnaur and Lahaul-Spiti.

b. Cultural characteristics: The tribal society is organised on the basis of kinship and they accept inheritance and authority through the male lineage. The rites of passage comprise birth, puberty, marriage, and death, and these stages of life play a very important role in tribal society for which initiation and training are provided carefully.

The major religious population of Himachal Pradesh State is Hindu, which constitutes more than 95% of the total. Muslim religion occupies the second position with nearly 1.7% of the total. Muslims have a little concentration in Sirmur, Chamba and Kangra. Among the tribal communities, Hinduism and Buddhism are followed. A minuscule proportion follows Islam.

(2) Remaining Villages Under the Jurisdictional Area of National Parks and Wildlife

It should be noted that under the jurisdictional area of national parks and wildlife sanctuaries in Himachal Pradesh State, 18 villages remain inside of the area as depicted in Table 10.3.1. These villages are located in extremely remote area, therefore, cannot be excluded through the rationalisation of boundaries of national park and wildlife sanctuaries, which has been conducted since 2014 based on the “Notification on Reorganisation of Territorial and Wildlife Divisions due to Exclusion/Inclusion of Certain Areas of National Parks and Sanctuaries” (No. FFE-B-A (1)-1/2013 dated 31st July 2014).

Table 10.3.1 List of Villages Inside the National Parks and Wildlife Sanctuaries

No.	National Park/ Wildlife Sanctuary	Village Inside of the Area
1	Bandli Wildlife Sanctuary	1 village (Neri)
2	Dhauladhar Wildlife Sanctuary	1 village (Bara Bhangal)
3	Gangul Siyabehi Wildlife Sanctuary	1 village (Khadroga)
4	Kalatop Khajjiar Wildlife Sanctuary	2 villages (Kalatop, Khajjiar)
5	Khokhan Wildlife Sanctuary	1 village (Lot)
6	Majathal Wildlife Sanctuary	9 villages (Jandred, Sohra, Bramana, Neori, Chilla, Mandrech, Kyari, Darwakot, Daud and Johar)
7	Great Himalayan National Park	3 villages (Shakti, Maror, Sagwad)

Source: JICA Survey Team from HPFD

10.3.2 Natural Environment

(1) Protected Areas

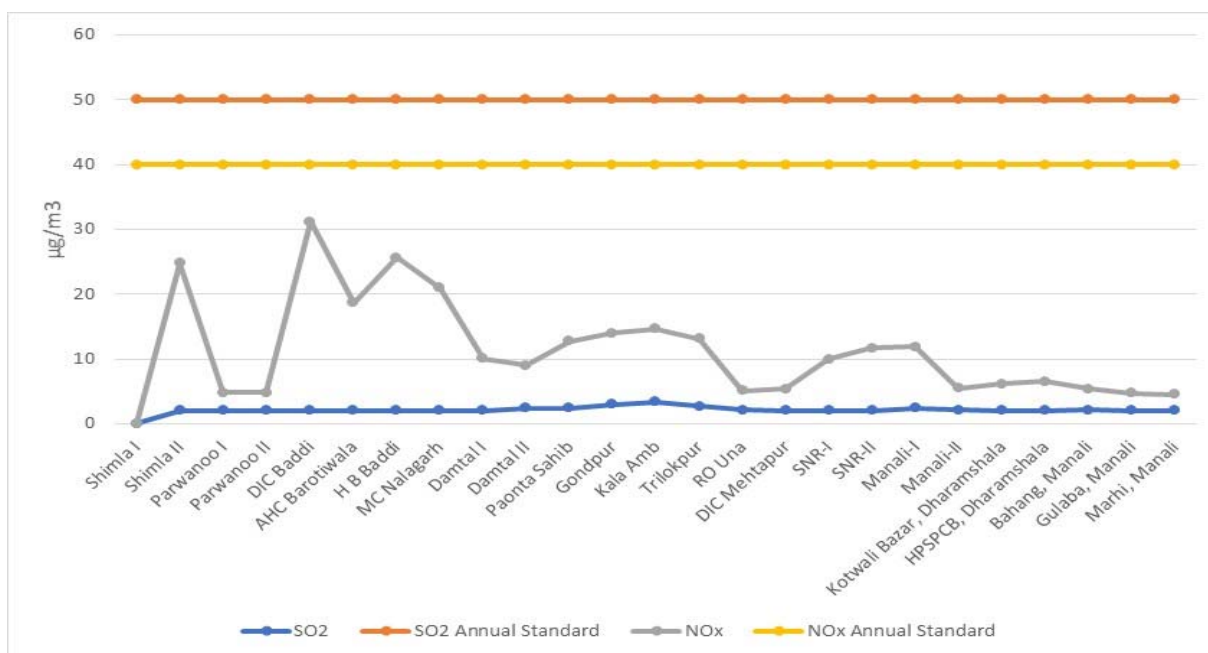
In Himachal Pradesh State, there are 26 wildlife sanctuaries covering a total area of 5,964.97 km², five national parks covering 2,407.28 km² and three conservation reserves covering 19.17 km².

Under the proposed Project, however, subproject indicative exclusion criteria are set up as depicted in the Environmental and Social Assessment Framework (ESAF). Among the screening criteria for subproject, the criteria for identifying proposed areas within 5 km radius distance from the national park, wildlife sanctuary and ecologically important habitats are screened out from the list, thus, there is no likelihood/possibility of any resettlement and rehabilitation of these indigenous population required due to project activities.

(2) Ambient Air Quality

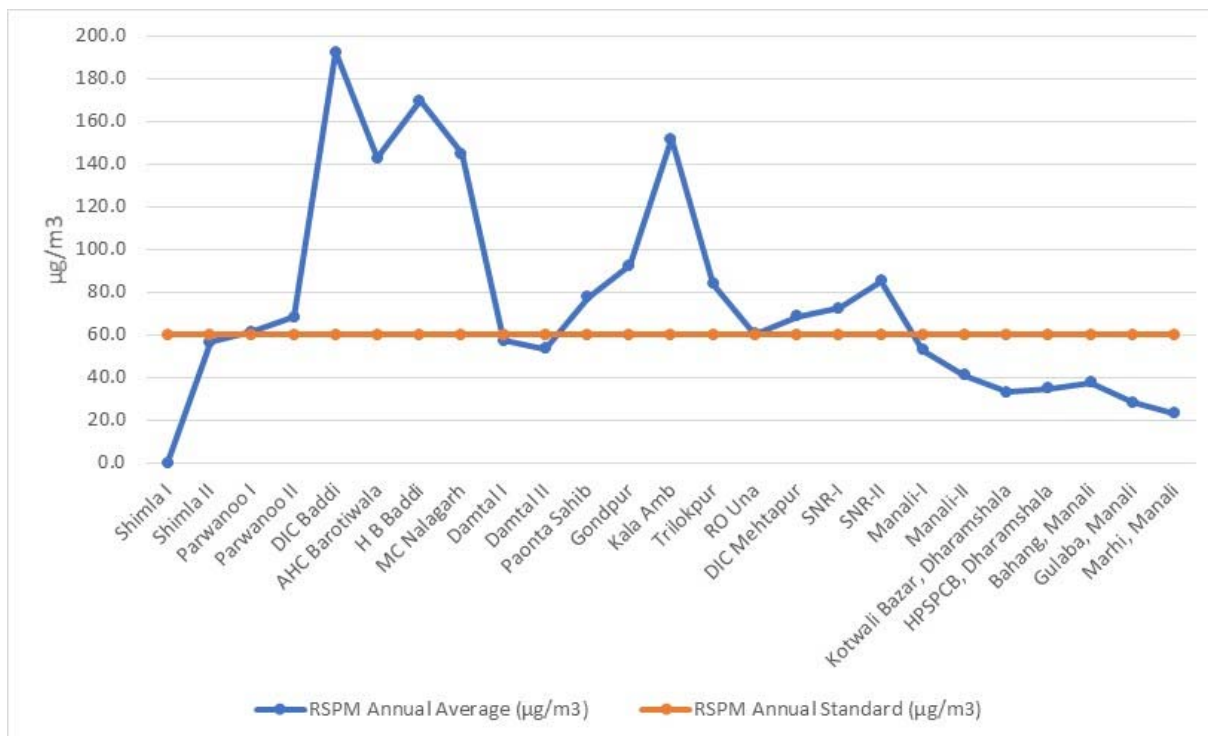
In Himachal Pradesh State, ambient air quality is being monitored in 11 towns/cities, namely; Shimla, Parwanoo, Damtal, Paonta Sahib, Kala Amb, Baddi, Nalagarh, Sunder Nagar, Manali, Una and Dharamshala, as part of the National Ambient Air Quality Monitoring Programme (NAMP). Air quality standards that have been fixed for 24-hour average include 100 µg/m³ for Respirable Suspended Particulate Matter (RSPM), 8 µg/m³ and 80 µg/m³ for SO₂ and NO₂, respectively, while the annual average standard fixed is 60 µg/m³ for RSPM, 50 µg/m³ for SO₂ and 40 µg/m³ for NO₂.

The data collected in all the stations for the year 2017-18 were scrutinised for the annual average and peak values for 25 locations, and trends of annual average of RSPM and SO₂ and NO₂ are shown in Figure 10.3.1 and Figure 10.3.2, respectively.



Source: JICA Survey Team from HPSPCB Annual Report 2017-18

Figure 10.3.1 Annual Average of SO₂ and NO₂ in Himachal Pradesh State During 2017-18



Source: JICA Survey Team from HPSPCB Annual Report 2017-18

Figure 10.3.2 Annual Averages of RSPM in Himachal Pradesh State During 2017-18

The annual average values of SO₂ and NO_x in all the stations were well below the annual average permissible limits. The peak value of SO₂ recorded was as high as 29.4 µg/m³ at DIC Baddi NAMP

station while the peak value of NO_x was observed as 58.8 µg/m³ at DIC Baddi and M.C. Nalagarh NAMP station.

On the other hand, the average annual values for RSPM levels recorded were above the permissible limits at the 14 out of 25 monitoring stations, namely, Parvanoo-I and II, DIC Baddi, AHC. Barotiwala, H.B. Baddi, M.C. Nalagarh, Paonta Sahib, Gondpur, Kala Amb, Trilokpur, RO Una, DIC Mehatpur, SNR-I and II.

(3) Ambient Noise Level

Noise pollution is often misunderstood as sound pollution. Sound is pure tune, harmonic, with fixed frequencies and amplitudes, occurring at regular intervals, producing meaningful communication and pleasure in hearing. “Unwanted sound” is noise, having a complex mix of pure tones of various frequencies and amplitudes. These sound waves fluctuate and repeat themselves in highly haphazard manner. Folks from cities, towns, and even villages are increasingly exposed to various sources of noise pollution, namely: loudspeakers, public address system, amplified music especially during social functions, movement of vehicles, blowing of horns, factories and industries, etc.

The State Board regularly conduct ambient noise monitoring for 48 areas/zones spread over the entire state..

Table 10.3.2 Noise Level Standards

Area Code	Category of Area	Limit in dbA	
		Day	Night
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Source: JICA Survey Team (2020) from <https://hppcb.nic.in/noise>

(4) Water Quality

One of the most important activities of the Pollution Control Board is to assess the status of water quality of natural water bodies. Water quality data reflects level of impacts on water quality and help in ascertaining the nature and extent of pollution control measures that are required. The Central Pollution Control Board is sponsoring the water quality monitoring of major rivers of the state through its national programme, namely, “Monitoring of National Aquatic Resources (MINARS)”, which is undertaken on a monthly basis. A total of 290 points have been identified on major rivers, i.e., Satluj, Beas, Ravi, Yamuna, Parvati, Sirsa, Markanda and Sukhna and their tributaries in the state. Table 10.3.3 depicts the criteria for primary water quality.

Table 10.3.3 Primary Water Quality Criteria

Designated Best Use	Class of Water	Criteria
Drinking Water Source Without Conventional Treatment but After Disinfection.	A	1. Total coliform organism MPN/100 ml shall be 50 or less. 2. pH between 6.5 and 8.5. 3. Dissolved oxygen 6 mg/l or more. 4. Biochemical oxygen demand 5 days 20 °C 2 mg/l or less.
Outdoor Bathing (Organised)	B	1. Total coliform organism MPN/100 ml shall be 500 or less. 2. pH between 6.5 and 8.5. 3. Dissolved oxygen 5 mg/l or more. 4. Biochemical oxygen demand 5 days 20 °C 3 mg/l or less.
Drinking Water Source After Conventional Treatment and Disinfection	C	1. Total coliform organism MPN/100 ml shall be 5,000 or less 2. pH between 6 and 9. 3. Dissolved oxygen 4 mg/l or more. 4. Biochemical oxygen demand 5 days 20 °C 3 mg/l or less.
Propagation of Wildlife and Fisheries	D	1. pH between 6.5 and 8.5. 2. Dissolved oxygen 4 mg/l or more. 3. Free ammonia (as N) 1.2 mg/l or less.

Designated Best Use	Class of Water	Criteria
Irrigation, Industrial Cooling Controlled Waste Disposal	E	1. pH between 6.5 and 8.5. 2. Electrical conductivity at 25 °C micro mhos/cm max. 2,250 3. Sodium absorption ratio max. 26. 4. Boron max 2 mg/l.

Note: If three parameters fall in Category 'A' but fourth parameter falls in Category C. The overall quality of the river will fall under Class 'C'

Source: JICA Survey Team from HPSPCB Annual Report 2015-16

10.4 Institutional Arrangement and Capacities of Implementing Agency for Environmental and Social Considerations

10.4.1 Overview

The Himachal Pradesh Agriculture Development Society (HPADS) will be the implementing agency (IA) for this Project and will execute the proposed activities. All activities of the Project shall be implemented in accordance with the legislation system at the national and state level, which provides clear guidelines and procedures for environmental and social safeguard. However, HPADS does not have dedicated units or personnel for implementation of environmental procedures such as screening, categorisation and environmental review as per prevalent laws and regulations.

In this regard, the Environmental Social Assessment Framework (ESAF) shall be the principal document, which provide the basis for detailed procedures for screening, categorisation and environmental review of the Project and its activities. For the implementation of ESAF, the IA will assign Nodal Officers for environmental and social safeguards.

10.4.2 Institutional Arrangement

In the Project, most of the environmental and social issues and protection are managed through the institutions responsible for agriculture development, i.e., Department of Agriculture (DoA), is responsible for overall planned intervention in the Project, legal/policy development, ensuring adequate consultation and participation, inclusion of vulnerable groups such as STs, small-scale and marginal farmers and women headed households, in planning and implementation and the equitable distribution of benefits associated with site-level project interventions. Other agencies would also be involved in different environment and social safeguard aspects or issues. The district administration is the designated agency responsible for land administration, land acquisition, disbursement of compensation and providing Resettlement and Rehabilitation (R&R) benefits to the project-affected families.

The ESAF will be implemented through the institutional structure of the Project and a director/ officers at each administrative level shall be appointed as focal persons for ESAF compliance. Table 10.4.1 highlights the institutional structure for ESAF with key environmental and social management roles and responsibilities.

Table 10.4.1 Institutional Structure for ESAF Implementation and Monitoring

Institution	Role in the Project	(Additional) Role and/or Responsibility in ESAF
Himachal Pradesh Agriculture Development Society (HPADS)	<ul style="list-style-type: none"> - Decision-making body - Lay-down the broad policy framework for functioning of the society - Review the society's performance - All administrative and financial powers - Monitor utilisation of funds 	<ul style="list-style-type: none"> - Overall supervision on ESAF and its implementation and M&E - Facilitation and coordination with various line departments and other agencies - Provide directions/advice to SPMU and DPMU to ensure smooth/ efficient project operation on environment and social consideration - Periodical checks and due diligence on safeguards reports, monitoring data, etc.
State Project Management Unit (SPMU)	<ul style="list-style-type: none"> - Project implementation, supervision and monitoring of all activities. - Documentation and reporting 	<ul style="list-style-type: none"> - Owner and implementation of ESAF - Report to concerned departments in the state government as well as to JICA in relation to environmental and social consideration - Information disclosure through project information brochures and project homepage, etc. - Consultation and guidance to DPD/DPMU/KVA, and field

• Institution	• Role in the Project	• (Additional) Role and/or Responsibility in ESAF
		<ul style="list-style-type: none"> level officers on information disclosure and consultation - Technical guidelines on beneficiary selection, safeguard checks/ guidelines for particular activities (if required) - Development of planning/ monitoring forms, review of monitoring data, reporting, assistance with evaluations - Finalise criteria for categorisation (Category B or C) as per JICA Guidelines as well as exclusion criteria - Review of participatory environmental and social assessments - Performance of due diligence follow-up - Guide, instruct, prepare guidelines, establish and operate M&E, dissemination of project information, hand-holding support in the field for all project activities
DPDs (Soil-Water Conservation and Agriculture Extension)	<ul style="list-style-type: none"> - Support and facilitate the SPMU for project implementation at circle level, and would extend all technical inputs and guidance to the DPMU level at requirement basis and through regular review meetings, which frequency to be determined during the preparatory phase of the Project - DPDs would not form the part of the society 	<ul style="list-style-type: none"> - Coordinate, monitor and supervise the ESC relevant activities at circle level, including the screening and selection of subprojects and determination of the required procedures for specific subprojects following the guidance/instruction of SPMU - Liaise with other line departments at the appropriate level for inter-sector convergence - Provide any specific support required for implementation and monitoring of the Project
District Project Management Unit (DPMU)	<ul style="list-style-type: none"> - Function as the dedicated and extended wing of the SPMU for project implementation at the division level and as a subordinate office of the autonomous society. - Facilitate project implementation at the division level, and would extend all technical inputs and guidance to the BPMUs 	<ul style="list-style-type: none"> - Coordinate, monitor and supervise the ESC relevant activities at the district level - Conduct the screening and selection of subprojects and determine the required procedures for specific subprojects following the guidance/instruction of SPMU - Liaise with other line departments at the appropriate level for inter-sectoral convergence - Provide any specific support required for implementation and monitoring of the Project - Coordinate with subject matter experts
Block Project Management Unit (BPMU)	<ul style="list-style-type: none"> - Facilitate project implementation at the block level, and would extend all technical inputs and guidance at the field level on day-to-day basis 	<ul style="list-style-type: none"> - Coordinate with block-level implementing organisation to select subprojects with screening procedures and to conduct participatory environmental and social assessments - Support block-level implementing organisation with monitoring and reporting, logistical support for independent evaluations. - Regularly undertake site visits at the construction areas to ensure compliance of ESAF.
Subproject Level		
Krishak Vikas Associations (KVA)	<ul style="list-style-type: none"> - Assist in selecting target beneficiaries - Clarify local needs and expectations on the Project 	<ul style="list-style-type: none"> - Conceive and raise awareness in the locality on environmental and social considerations. - Provision of support in micro planning activities at the subproject level. - Participating in environmental and social assessments - Support public consultation and due diligence checks.

Source: JICA Survey Team

As mentioned earlier, HPADS or DOA does not have any dedicated units or personnel for the purpose of ESC. Hence, one specialist in PMC and Nodal Officers will support SPMU and DPMU for the compliance of the environmental and social safeguards for its smooth and efficient implementation such as environmental and social assessment, management and monitoring of the environmental and social aspects within the ambit of the Project, which are proposed as follows:

(PMC member) Environmental and Social Consideration Specialist: The specialist is planned to be deployed under the Project Management Consultant (PMC) to assist SPMU and DPMU on ESC issues of the Project. He/she is expected to support SPMU and DPMU to review the project activities with focus on the compliance on ESAF, provide guidance and technical advice to SPMU and DPMU for required environment and social safeguard measures, as well as reporting to JICA to ensure smooth and efficient implementation of environment and social safeguard measures.

(Nodal Officers) Environmental and Social Consideration Experts: The experts shall/ could be engaged as contract basis with SPMU from the initial preparatory phase of the Project. This is to assist the SPMU and DPMU in head start with the safeguard related actions while waiting for the PMC specialist to be placed. Once the project implementation begins, the experts shall fulfil the gaps that may occur, while the PMC specialist is absent from the field. The experts will report to the Director under SPMU who would be vested with additional charge to ensure the compliance of ESC. The experts will assist SPMU and DPMU in the following aspects:

- i) To facilitate and coordinate with various implementation and line departments;
- ii) To update and finalise ESAF;
- iii) To develop appropriate training materials on environmental and social safeguards, following the requirements in ESAF;
- iv) To provide training courses and capacity enhancement at the different levels of stakeholders who will be designated with the responsibilities to ensure implementation of environment and social safeguards; and
- v) To supervise/ manage the project activities to ensure that the required procedures indicated in ESAF are followed properly. The experts may also be required to follow-up in the field, where particular issues are identified and report to SPMU.

The institutional arrangement for monitoring system is basically similar as the project component monitoring system. At the subproject level, monitoring and reviews will be conducted by respective level implementing organisation and report to BPMU. Then, BPMU officer shall compile monitoring results and reviews regularly, thereafter, DPMU shall compile and report to SPMU, which analyse the result and share to concerned departments in the state government as well as annual report to JICA. The organisation chart is shown in Attachment 10.4.1.

10.4.3 Draft Environmental and Social Management System Checklist

As mentioned above, SPMU shall mobilise Nodal Officers at the preparatory phase of the Project and the experts shall support SPMU and DPMU for the finalisation of ESAF document, which fully addresses all issues arising under the Project and its activities/subprojects. Mitigation measures will be built into project component design and implementation. Under the Project, as mentioned above, the overall coordination and support for ESAF will be provided through SPMU headed by the Director vested with additional responsibility to ensure implementation and monitoring and compliance of ESAF during the project implementation. Under the supervision of SPMU, his/her deputies will hold position as Environmental and Social Safeguard Managers for their activities in each designated work field. In order to examine the proposed institutional arrangement and enhance its system, the draft Environmental Social Management System (ESMS) Checklist for the Project has been prepared and depicted in Attachment 10.4.2.

10.5 Draft Environmental and Social Impact Assessment Framework (ESAF)

10.5.1 Overview

Unlike a typical infrastructure project, this Project is anticipated to have multi-sectoral interventions and activities, being implemented at several sites with many subprojects and many of these subprojects are yet to be defined in detail (site location, size/scope of the activity). In these circumstances, it would be inappropriate at this stage of project preparation to assess the environmental and social impacts and propose detailed management and mitigation measures. However, the JICA Survey Team assessed the broad types of activities proposed and outlined the procedures to manage and mitigate potential risks associated with the activity during the project implementation. Accordingly, ESAF which provides guidance on the appropriate management and mitigation measures against environmental and social risks was prepared as the main safeguard instrument considering the existing environmental and social management systems in India and Himachal Pradesh State as well as the JICA requirements.

10.5.2 Structure

The ESAF of the Project is structured as follows while the draft ESAF with detailed measures and procedures is presented in Attachment 10.5.1;

- i) **Project Summary Description** will describe the project objectives, project components and expected outcomes, phasing of Project, etc.
- ii) **Environmental and Social Safeguard Policies of JICA:** briefly describes JICA's environmental and social safeguard policies, and clarifies how the Project shall be categorised and what types of measures will be required.
- iii) **Existing Environmental and Social Management Systems:** Outline the legal and policy context for environmental and social safeguard in India as well as in the Himachal Pradesh State.
- iv) **Environmental and Social Considerations and Potential Impacts:** details-out the environmental and social considerations within the Project and assessment of positive and negative impacts.
- v) **Environmental and Social Management Measures and Monitoring:** explains the procedures to be followed to manage and monitor environmental and social aspects.
- vi) **Environmental Management Plan and Environmental Monitoring Plan:** describes the management measures adopted for various environmental concerns, risks associated with the Project/ subproject activities and monitoring plans to address environmental concerns (a draft monitoring form is Attachment 10.5.2).
- vii) **Institutional Arrangement and Capacity Development for ESAF:** identifies the recommended institutional arrangement and capacity development and training requirements for effective implementation of the ESAF.
- viii) **Consultations and Participation:** describes the mechanisms for consultations and participation.
- ix) **Grievance Redress Mechanism:** identifies the available and suggested mechanisms for grievance redress, and
- x) **Cost Estimation and Budget Allocation:** identifies the required cost to implement ESAF, with the estimation of the necessary human resources and capacity development programme, and its budget allocation.

10.5.3 Target Social Groups

The ESAF shall be applicable to all communities and peoples within the project area. The draft framework is designed to ensure their participation in the course of the project implementation and include as beneficiaries as well as to avoid/mitigate any impacts affected by the Project. ESAF indicates the key groups identified in ESAF to address environmental and social considerations. It should be noted that an individual or household may be categorised into more than one of the categories.

10.6 Recommendation of Inclusion of Environmental and Social Consideration in the Model DPR

Referring to the EIA Notification (2006), all projects and activities are broadly categorised into three categories, i.e., Category A, B1 and B2, based on the spatial extent of potential impacts on human health as well as natural and man-made resources. In case a project is classified as Category B2, environmental survey and environmental clearance issued by the State Environment Impact Assessment Authority are not necessary. The project has several activities, e.g., installation of irrigation system and introduction of new crop, but the area of the subproject is not large, about 100 ha. Therefore, the project might be classified as Category B2. However, improvement of agricultural chemicals (pesticide and fertiliser) may cause deterioration of groundwater. Introduction of facility may cause air pollution and noise. Thus, environmental and social impacts should be considered after the selection of subproject with further information.

JICA has classified the project as Category B. The JICA Environmental and Social Guidelines requires Initial Environmental Examination (IEE) for Category B projects. This project aims to be funded by JICA; it is deemed that IEE is basically necessary.

In the meantime, as final location and contents of the subprojects would not be determined before the JICA loan agreement, IEE cannot be conducted during feasibility study (F/S) stage. The F/S will review the environmental and social impact assessment framework formulated in HPCDP I and collect information on environmental and social considerations so that necessary environmental and social considerations will be taken just after specifying the subprojects. If a subproject is regarded as Category B, the project is required to conduct environmental and social considerations study.

The ToR of the JICA Survey requires to prepare the criteria for selection of subproject from the viewpoint of environmental and social considerations and establishment of environmental and social impact assessment framework. Classification of the category for each subproject and necessary environmental and social consideration measures are determined/prepared through two steps, i.e., the F/S period and detailed design period, in accordance with the ToR. Hence, it is difficult to determine the necessity of environmental and social study during the F/S stage, and the decision will be made after the selection of the subprojects using the framework.

DPR mentions that EIA and IEE are not necessary with preliminary screening even though present situations at sites and original designs are not clear. After the selection of the subprojects with original designs, screening at each subproject must be implemented; therefore, the F/S survey should collect environmental and social information and predict possibly necessary procedures to make provision for smooth implementation of the project. (Environmental Checklist was prepared as Attachment 10.6.1.)

Chapter 11 Recommendations

11.1 Early Implementation of the Project

According to the sample survey and series of discussion with the Himachal Pradesh government, the strong motivation and needs for implementation of the Project are confirmed. Although the project activities of HPCDP I will be wound up in March 2021, the Himachal Pradesh state government will maintain the Project Management Unit (PMU) with state fund in order to use the developed human resources fully for HPCDP II. These budgetary measures are an expression of the Himachal Pradesh government's desire to carry out the project and achieve good results.

In addition, the economic internal rate of return (EIRR) drops by 1% when the implementation is delayed by five years while the current economic evaluation results show an EIRR of 14.4%. From these points of view, early conclusion of official development assistance (ODA) loan agreement and implementation of the Project at an early stage are desirable.

11.2 Flexible Project Operation Refracting Actual Needs and Trends

The necessary project components and implementation plan including implementation organisation, necessary costs and so on to achieve the project goals were identified during the preparatory survey. However, these components are, in practical, rearranged and implemented in the newly formulated three-layer plan namely: overall implementation plan, supply chain and market development plan and crop diversification plan in subprojects as shown in Chapter 6. It is hoped that these plans will be flexibly formulated, reflecting the needs of farmers and market trends. In HPCDP I, the strategic crops, which should be flexible in nature, have been fixed because they are largely stipulated in the decisions made at the appraisal stage. Based on such lessons, flexible project operation is highly recommended.

11.3 Support PMU with Collaboration of Technical Cooperation Project

As the new agricultural ordinances come into force, Himachal Pradesh, which is dominated by smallholders, will have a risk for inefficient trade under liberalisation of the agriculture marketing. The additional costs due to inefficient distribution are burdened by small-scale producers who do not have negotiating power and farmers may not be able to enjoy the appropriate benefits of crop diversification. In addition, individual trade with small-scale farmers may be unattractive to distributors or collectors, which narrows the options for farmers to sell their farm produce. It is therefore that organisation and strengthening of Farmer Producer Organizations (FPOs) tried in HPCDP I will be continued in HPCDP II and at least ten FPOs will be established in the Project. In addition, from the perspective of sustaining the results after the project completion, there is a need to improve the extension system using the private sector, advanced farmers and FPO. Since the Department of Agriculture (DoA) does not have accumulated sufficient knowledge on the establishment and capacity building of these FPOs and establishment of new extension system, DoA plans to procure a knowledgeable consultant.

However, according to the current implementation process, the procurement of consultants is expected to take one year (until April 2022) after the conclusion of a loan agreement, although initial input with sensitisation is crucial. In order to fill the initial time gap, the scope of the Japan International Cooperation Agency (JICA) Technical Cooperation Project currently being implemented will be amended and the implementation period should be extended by at least one year to support the PMU.

11.4 Collaboration with Other Relevant Departments and Projects

Agroecology zones 2, 3 and 4 with an altitude of 1,500 m or higher occupy 60% of the total in the target area of this project. Since the slopes of zones 2, 3 and 4 are steeper than those of Zone 1, some farmers are cultivating fruit trees. Currently, no fruit trees are cultivated in the irrigation command area; however, farmers may choose fruit trees as strategic crops after crop diversification is progressed. At present, fruit trees are under the jurisdiction of the Department of Horticulture (DoH) and DoH operates some central sponsored schemes and donor support projects to support fruit farmers. When farmers choose fruit trees as crops for crop diversification, it is necessary for PMUs to properly bridge with DoH.

At the same time, support for Himachal Pradesh State Agriculture Marketing Board (HPSAMB) is also being provided by DoH with the funds of the central and state government and donors' fund. Although the commodities handled by each department are different, both departments could get benefit through enhancement of market functions such as establishment of market information provision system.

Regarding livelihood improvement activities, activities such as livestock farming, inland fishery and vocational training are planned. These activities are under the jurisdiction of the Department of Animal Health, Department of Fisheries and the Department of Commerce and Industry. In order to carry out these activities effectively, it is essential to collaborate with these organisations that have knowledge.

Currently, in HP, as shown in Chapter 2 and as shown in DPR, a wide variety of projects are implemented with central government, state government and donor agencies sponsorship. in the field of agricultural development and poverty reduction. Most of them are carried out for aiming to improve farmers' incomes through improving agricultural productivity and profitability which is the same objective of the Project. From the perspective of project efficiency, impact, and sustainability, it is important to formulate a project implementation plan in consideration of cooperation between these projects at the project implementation and post project stage.

Table 11.4.1 Possible On-going & Coming Project and Initiatives to Converge

Project Components	Central Sponsored Scheme	State Sponsored Scheme	Donor Funded Scheme
Infrastructure Development	<ul style="list-style-type: none"> • Rural Infrastructure Development Fund (RIDF) • Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhayan Scheme (PM-KUSUM) • Mukhya Mantri Khet Sansarkshan Yojna (MMKSY) 	<ul style="list-style-type: none"> • Rajiv Gandhi Micro-Irrigation Scheme (Efficient Irrigation through Micro-irrigation Scheme) • Saur Sinchayee Yojna • Lift Irrigation and Borewell Scheme • Flow Irrigation Scheme • Jal Se Krishi Ko Bal Yojna 	
Farmers' support	<ul style="list-style-type: none"> • National Food Security Mission (NFSM) • Prampragat Krishi Vikas Yojna (PKVY) • National Mission on Agriculture Extension and Technology (NMAET) 	<ul style="list-style-type: none"> • Praktirik Kheti Khushal Kisan Yojna • Uttam Chara Utpadan Yojna 	<ul style="list-style-type: none"> • Himachal Pradesh Subtropical Horticulture, Irrigation and Value Addition Project (ADB)
Value chain and marketing development	<ul style="list-style-type: none"> • Promotion of Farmers' Producer Organisation (FPO) • E-National Agriculture Market (E-NAM) 		<ul style="list-style-type: none"> • Himachal Pradesh Horticulture Development Project (World Bank) • Himachal Pradesh Subtropical Horticulture, Irrigation and Value Addition Project (ADB)
Institutional Development			<ul style="list-style-type: none"> • Phase II Project for Crop Diversification in Himachal Pradesh (JICA)

Source : JICA Survey Team

11.5 Strengthening of Linkage between DoA and PMU for Project Suitability

Since this project will be implemented in Society Mode, it is important how to transfer the results from Society to DoA during and after the project. Strengthening of extension function, which is one of the Institutional Development Components, is one of the activities aimed at the smooth transfer of the project results to DoA staff. Under such circumstances, it is important to carry out regular information exchange and knowledge sharing between DoA and PMU along with strengthening information and communications technology (ICT).

Also, in HPCDP I, it was planned to establish a new department for marketing activities and Water Users Association (KVA) support, and to revise the scope of work of extension workers: however, in reality, it was not implemented. In HPCDP II, it is necessary, at least, to clarify the person in-charge within the DOA of FPO and WUA before starting the project, and their duties and responsibilities should be officially notified in gazette. Meanwhile, duties and responsibilities on nutrient improvement are also included in job profile of field extension officers in 12 Districts.

It is intimated that strengthening of extension activities should be embarked in extension system, which is established in 12 DDAs beyond linkage between DoA and HPCDP. Namely, capacity building of extension officers in 12 DDAs should be conducted through training programmes, and field activities with extension officers of PMU. Further it is expected that extension service function in 12 DDAs should be strengthened, applying activities of Institutional Development Component in HPCDP-II. It is also suggested that practical function, system, skills, and outputs, which are obtained from HPCDP, should be utilized in DDAs without having to wait for the completion to find out all outputs of HPCDP II.

11.6 Achievement of Project Target through Active Utilisation of JICA SHEP Approach and Nutrition Improvement Initiative

As mentioned in Chapter 6, JICA is implementing Smallholder Horticulture Empowerment & Promotion (SHEP) all over the world including the South Asian region, and this method is being recognised as one of the best agricultural development methods in the world. SHEP started in Kenya as the first target country and has already spread to 26 countries in Africa and in recent years, it has been actively working to spread it to the South Asian region such as Pakistan, Bangladesh, Nepal and Sri Lanka. At the discussions between JICA and DoA held in November 2020, Dr. Jiro Aikawa, JICA Senior Advisor, explained the contents of SHEP and DoA gave positive opinions for future utilisation of the method in the Project. Also, nutrition improvement is one of the foci of JICA especially in the South Asian region.

A total of eight overseas trainings are planned for the project and the JICA Survey Team proposes to utilise these trainings to show advanced cases of these initiatives in Japan or other countries at an early stage and incorporate those concepts into the Project.

11.7 Collect Necessary Data in the Initial Stage of the Project

In this survey, under the influence of the COVID-19 pandemic and due to underdeveloped information service system of concerned agencies, some data related to supply and demand of agricultural produce in and out of the state, domestic and foreign investment in agriculture field and food processing industry were not collected. Since these information are important for formulating the Supply Chain and Market Development Plan created in each collection centre during project implementation, it is necessary for DOA to collect those information in the initial stage of the Project in collaboration with HPSAMB. It is also recommended that DOA and other agencies concerned to value chain and market development of agricultural produce implement a sophisticated information collection and analysis system into their routine works to cope themselves with ongoing dynamic structural change of agricultural market.

11.8 Update of Master Plan

With JICA assistance, DoA compiled the development survey of "Himachal Pradesh Crop Diversification Comprehensive Development Survey" in 2009, and the "HP Crop Diversification Program" was formulated as one of the HP Agricultural Sector Master Plans. The master plan assessed (1) agricultural policies and organizational systems of the central and state governments, (2) natural conditions / economic and social conditions, (3) current status of agricultural production, agricultural product supply / demand, distribution system, etc., and specified crop diversification plan based on these assessments. The crop diversification plan includes basic strategies, goals, and action plans for further agriculture development. The target year for the master plan is 2022/23, and 10 years have passed since the plan was formulated, and the situation is expected to change from the time the plan was formulated. Therefore, DoA should update the master plan based on analysis of the current policies, situation and issues and the basic strategy, goals, and action plans should be modified.

11.9 Collaboration between Agriculture Extension and Anganwadi Officers

As one of the Farmers' Support Components, the project aims to promote the consumption of nutritious vegetables and to disseminate the cultivation technology of those vegetables by promoting the School Garden and Kitchen Garden. These activities are planned to be carried out through agriculture extension officers, but activities in collaboration with Anganwadi officers under Department of Women and Child Development are desired. By collaborating, agriculture extension officers who have cultivation techniques can acquire knowledge about nutrition improvement, and Anganwadi officers can acquire knowledge about cultivation. As a result, cultivation and nutrition are integrated, and the quality of administrative services to farmers is improved.

At the preparatory survey stage, the necessity of these collaborations can be shared among the stakeholders, but discussions on cooperation and implementation systems have not progressed. It is recommended that the cooperation mechanism under the project between the two parties will be discussed before the start of the project.