

Analysis of FPO (cluster production) model for Vegetables

1. Introduction

India is the world largest producer of many vegetables but there still exists huge gap between per capita demand and supply due to enormous waste during post-harvest handling & marketing. These losses are a missed opportunity to recover value for the benefit of farmers. The deploying of appropriate strategic and operating models, will allow the efficient closure of gaps between demand and supply so as to contribute to doubling farmers' income.

The gaps between demand and supply are primarily due to ineffective market links and lack of consolidation on both the demand-side and supply-side. On the supply side, the government has agenda to promote modern cultivation practices, lower input costs and most importantly to counter fragmentation of farm lands by promoting FPOs (Farmer Produce Organisations) for collaborative farming. FPOs are commercial enterprises formed by partnering a minimum of 1000 farmers.

2. Summary of FPO model

The Farmer Produce Organisation (FPO) model has one key differentiation from others operating models – FPO concept was conceived with the intention to strengthen the negotiation prowess of farmers through developing judicious economy of scale at the farm-gate. This infers that farmers will collaborate on the supply side of the (for production and post-harvest market connectivity).

The perceived economy of scale needs to essentially translate into a viable logistical capacity on the following principal fronts-

- a. Raw Inputs (eg. assured volume of fertilizer and planting material can lead to incremental reduction in input costs)
- b. Farm mechanisation (eg. contiguous farming can lead to viable deployment of harvesting combines or other farm mechanisation – incremental reduction to labour)
- c. Post-harvest Infrastructure (eg. capacity utilisation is justified for pack-houses, grain silos, transportation, etc. – a transformational change in supply chain)
- d. Market access & connectivity (eg. control of value chain system shifts into hands of FPOs once meaningful volumes are available to transact on both supply and inputs)

At the moment, in its first phase of development, the FPO formation has primarily been focused on clubbing interested farmers together to avail options of equity and credit support. This support is expected to translate into professional management for the production and market linkages. This may also need to be matched with allied development efforts to coerce members of FPOs to achieve a relevant scale of operations through collaborative farming.

The central support to form and strengthen FPO may require for closer participation from State governments. FPOs are currently not formed on basis of preferred crop type (vegetables) or with bias for availability of contiguous land. In the future, this exercise could be undertaken so as to enable support on production side on specific cultivars for targeted markets. In the next phase of development, FPOs may be identified on basis of availability of contiguous arable land, with aim to provide related soil analysis / inputs, a set of common crop type and to establish long term market linkage for selected 4 to 6 crop types. This next step in FPO development will require coordination of efforts at State level with central support. It is to note that FPOs can also be created for group of farmers in close proximity to urban centres, however, the economy of scale from collaborative farming will not be readily manifested unless landholding is contiguous.

A large scale FPO is an enterprise intended to generate a minimum economy of scale at farm-gate and need not be confused with a cluster of individual farms, locate in proximity to a city (ready markets at short distance). Some differences in the models are indicated in table below-

Key differentials: FPO and city-proximate Farm Clusters

Model	Description
FPO – large scale volume at each transaction level, can build multiple market links.	<p>Farm-gate economy of scale, to establish crop-specific production centres, to function as collaborative farms, create areas of farming excellence, justify building of post-harvest supply chain with relevant buffers. As the key difference is scale, the FPO model can manage entire supply chain and connect with multiple consumption centres.</p> <p>FPOs would preferably leverage collaboration to optimise supply side costs and service a push mode of business into multiple markets. Open field cultivation and bulk handling of produce is possible, along with vertical integration with food processing factories. Large scale branding of fresh produce from captive fresh produce pack-houses is foreseeable.</p>

Peri-urban Farm Cluster – to service nearby market pull, faster value realisation cycle.	<p>Peri-urban clusters of farms, each leveraging farm-proximate demand. Target market would be nearby urban centres and demand can be closely monitored by linking with organised retail and cluster of retail shops. The key difference is ready access to market and hence customised crops and specialised produce can be managed on demand.</p> <p>Individual farms with protected cultivation and private label of farm produce is readily possible, with SME based processing to utilise handling waste. Peri-urban clusters would preferably leverage a pull mode from nearby single market.</p>
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The marketing support needed to each business model type will vary on soil and crop type, location and type of cultivation practices followed. FPOs that excel in a specific crop type can be in close proximity to a consumption market. In such cases, a dual model will be seen, where a cluster based approach to local demand will be met as well as large volume push into other consumption centres. A combination of business models will be practiced in most cases.

3. Parameters to Identify existing FPO in vegetable production the strengthen dealing with vegetable commodities:

For the purpose of this analysis, a list of FPOs local to Delhi NCR region was assessed on the following premises:

- a. Existing Land under vegetable cultivation
- b. Existing volume of sales in vegetables
- c. Existing contiguous land under FPO
- d. Available technology to manage long distant markets
- e. Available professional management in FPO

Initially, on basis of available information, a total of 18 FPOs were identified with proximity to Delhi NCR. However, such assessment can be carried out regularly to identify FPOs for multiple target markets. The agenda would be to have information which will help develop specific support for FPOs to connect produce with markets with increasing volume and for longer period in year.

4. Measures to organise FPOs in vegetable production zones:

SFAC (Small Farmers Agribusiness Consortium) is the nodal agency for creation of FPOs. At the moment, FPOs are created on direction of State govts, by mobilising the required group of farmers in a region. However, such mobilisation does not take into effect the available land area, type of crops grown or capacity or capability of the

farmer groups. To further development efforts the following steps are recommended for FPOs to be market linked –

- a. Identify FPOs with contiguous land or scalable production**
- b. Identify target markets**
- c. Map consumption at target markets – crop wise with volumetric demand**
- d. Evaluate distance from FPO location to target markets**
- e. Evaluate produce selling cycle, minimum and maximum**
- f. For each selling cycle of greater than 48 hours, list the added support systems required to access the markets**
- g. Support FPOs to develop relevant market infrastructure /linkage.**

The directed approach to linking FPOs with target markets, is expected to result in an immediate thrust on productivity at farm level. Without appropriate market linkage, farmers are hesitant to adopt high productivity practices for fear of incurring losses due to low level of market access.

Modern methods of evacuation to market - Logistics connectivity - also brings associated reduction in losses and improvement in value realisation.

5. Economy of scope and scale on input and output:

The main reason for developing FPOs is to counter the increasing fragmentation in farm-holding size, by promoting collaboration in land-holders. This is expected to regain economy of scale that suffered due to fragmentation.

Economy of scale on inputs –through negotiated procurement of planting material, cultivation support, irrigation, infrastructure, services, etc. The following aspects may need to be tabulated (crop and region specific) and studied to achieve the information, where unit is 1x, 10x 100x hectares-

- i. Irrigation cost per hectare (conduit, pumps, energy, repairs)**
- ii. INM / IPM cost per hectare**
- iii. Extension services per hectare**
- iv. Farm mechanisation options and cost (with minimum viable area)**
- v. Harvesting cost per hectare**

A separate study with inputs for selected vegetables will be necessary to tabulate the advantages from economy of scale. However, rough estimate drawn is that for every 50 acres of land under cultivation, a percentile reduction in overall input costs can be driven. Furthermore, there is immense scope to reduce non-fungible inputs such as

extension work, R&D efforts, energy linkage, etc. all of which are necessary to make cultivation more competitive and environmentally relevant.

Economy of scale on outputs –negotiated selling, operational cost of transport services & infrastructure, ease of handling, lowered supply side losses, extended market reach, etc. There are two basic constraints in handling output from farms – perishability and associated access to market. Unless these two aspects are managed, growth in production results in greater losses and/or distress sales. Market access in case of perishable vegetables is lacking mainly due to lack of preconditioning centres and transportation (refer AICIC2015-NCCD). The minimum scale required by FPO is to generate a viable capacity use of the post-harvest infrastructure components, while retaining priority to reach distant markets. The following aspects can be quantified to assess such information (crop wise)-

- i. Daily production per hectare
- ii. Daily throughput for preconditioning (size of pack-house)
- iii. Minimum lot size for market dispatch

In referring to NCCD documents, every 200 hectare under contiguous cultivation can benefit from a modern pack-house designed to throughput 15 tons a day. Such a pack-house would also require a 15 ton vehicle or 3 vehicles of 5 ton size (AICIC-NCCD2015). Final number/size of transport units will be a factor of distance to target market (NCCD uses a factor of 350 kms/day of travel) and individual to project each supply chain project.

Depending on crop and other parameters, a regional processing unit can also be justified to recover value from mishandling or other culled produce at each FPO centre. A special team can be deployed to assess individual scope for FPOs in regionally differentiated areas.

6. Govt. Interventions to support and incentivise the perishable agri commodities:

Ongoing support for FPO is in form of –

- Grant of matching equity (cash infusion of upto Rs 10 lakhs) to enhance the credit worthiness of registered FPOs (Farmer Producer Company - FPC).
- Credit Guarantee Cover to Eligible Lending Institution (ELI) to minimise their lending risks and thereby enable provision of collateral free credit to registered FPOs (maximum guarantee cover 85% of loans not exceeding Rs. 100.00 lac).

FPOs can also avail support provided for post-harvest management and processing under general category, vide-

- Post-harvest Infrastructure support from MIDH (DAC&FW) - central sector scheme and centrally supported scheme.
- Processing Industry infrastructure from MoFPI – central sector scheme.

Except for SFAC whose mandate is to create FPOs, there is no evidence of concerted effort to develop specific support to FPOs by other development agencies. For example, there is no special status to FPOs for supporting their infrastructure development or marketing of their produce. Similarly, on cultivation aspect, thrust could be given to develop commercial scale horticulture or livestock farming for FPO members. Once a group of farmers come together to form an FPO/FPC, then next outcome should be common cultivation with economy of scale in its yields.

Farmer Producer Organizations (2017- PAN India)					
No. of Farmers			No. of FPOs		
Mobilized	Under Mobilization	Total	Registered	Under registration	Total
5,83,858	1,17,358	7,01,216	571	129	700

FPOs were intended as a counter to the bane of small land holdings and fragmented farming practices. The concept behind FPO is to bring collaboration / organisation among farmers, resulting in lowered production cost and higher scale in aggregation for market linked benefits. Therefore, the focus areas could be more on specific crop types and developing economy on cultivation side – breaking the barrier of fragmenting farm lands.

Delhi Kisan Mandi *(from inputs by SFAC)*

Delhi Kisan Mandi is an existing intervention by Govt of India where various FPOs/Grower Associations bring fresh produce, such as fruits and vegetables, for direct wholesale supply to bulk buyers (including various kinds of institutions like hotels, hostels etc), processors, exporters, traders, organized retailers, RWAs, the general public and other entities.

Inspite of delay in construction of Kisan Mandi building, SFAC has undertaken certain initiatives for the Kisan Mandi:-

- i) SFAC has selected a Strategic Management Partner (SMP), for the day-to-day operations of the Kisan Mandi, under the overall supervision and guidance of SFAC and develop the business potential of the platform.

- ii) **Sale through Delhi Kisan Mandi:** As on date, a total of 28,483 MT vegetables such as potato, onion, fresh greens and citrus sourced directly from farmers valued at Rs. 30.75 crore have been sold through Kisan Mandi to organized retailers, wholesale buyers and small quantities through Delhi Milk Scheme kiosks to retail consumers.
- iii) **Developed transaction software of Kisan Mandi for online trading and management operations.** The progress of e-Kisan Mandi is as under:
 - **Software for e-auction is completed** (<http://delhi.kisanmandi.in>).
 - **Product Specific Quality Norms:** Initially quality parameters for 33 items (20 fruits and 13 vegetables) has been prepared.
 - **Buyer/Seller/Kisan Mitra Registration:**
 - **Process of Buyer/Seller registration has been tested and is live.**
 - **Currently, 54 buyers & sellers registered on e-Kisan Mandi Platform.**
 - **24 kisan mitra registered (facilitator for seller/farmer/FPO/group of farmers) for e-KisanMandi platform as in process of registration. As on date about 24 kisan mitra has been empanelled.**
 - **Trial run of Auction Platform has been done successfully with onion. Approx 498.41 MT of Onion has been sold through E-Kisan Mandi online trading platform.**

Following immediate interventions required from the implementing agency for strengthening the Delhi Kisan Mandi are proposed:

- i) **Farmer Producer Organization wise infrastructure gaps needs to be addressed immediately such as requirement of collection center, pack house, cold store, primary processing, ripening chambers, pre-coolers, mobile vending cart. To bridge the gap, these infrastructure requirement needs to be linked with MIDH scheme immediately.**
- ii) **Training Farmer Producer Organizations on suitable business practices, ie.-**
 - **Localised project management and maintenance to upkeep its infrastructure**
 - **Contract and Commercial negotiation practices**
 - **Best practices in Post-harvest handling of target produce.**

In addition to above, the following support to strengthen the Delhi Kisan Mandi is proposed:

- i) **Developing crop based FPOs in and around Delhi (FPOs will need to be registered in contiguous land for a particular crop).**
- ii) **Developing each FPO with focus on the declared crop type.**

Strengthening of Delhi Kisan Mandi through dovetailing of activities of related implementing agencies, is recommended, as an immediate actionable item. It is recommended that these recommendation cascade into action plans of State and Central level implementing partners.

7. Policy Recommendations

At a policy level, it is proposed to add following aspects to the ongoing strategic support for Farmer Producer Company (FPC), keeping a focus on vegetables:

- i. **Categorise FPC for developing contiguous cultivation and with crop wise focus.**
- ii. **Fast tracked soil health mapping and crop planning for each FPC.**
- iii. **Provide FPC with scientific and specific crop plans for 3 years.**
- iv. **Develop or simultaneously provide forward linkage of FPC with packaging and transport links. This can be handled under FPC ownership or by providing a service guarantee to existing service providers.**
- v. **All procurement by government agencies be made through FPOs, preferably.**
- vi. **Special incentive to FPCs that are willing to set up infrastructure in mega food parks.**
- vii. **Wholesalers that develop long term buying arrangement with FPCs be provided a freight subsidy on the throughput as declared/certified by FPC.**
- viii. **In case of FPCs producing vegetables, automatically assign an integrated pack-house (25 kw pre-cooler and 2 reefer trucks) with 3 years' consumables. Extension/hand holding arranged for streamlining evacuation from farms to markets for same period.**
- ix. **Reefer Transporters that service FPCs be allowed waiver on fees for inter-state transport permit.**
- x. **Current practice of measuring achievement by size of number of post-harvest infrastructure be changed. Instead, implementing agency should measure physical achievement on basis of throughput capacity from infrastructure developed.**

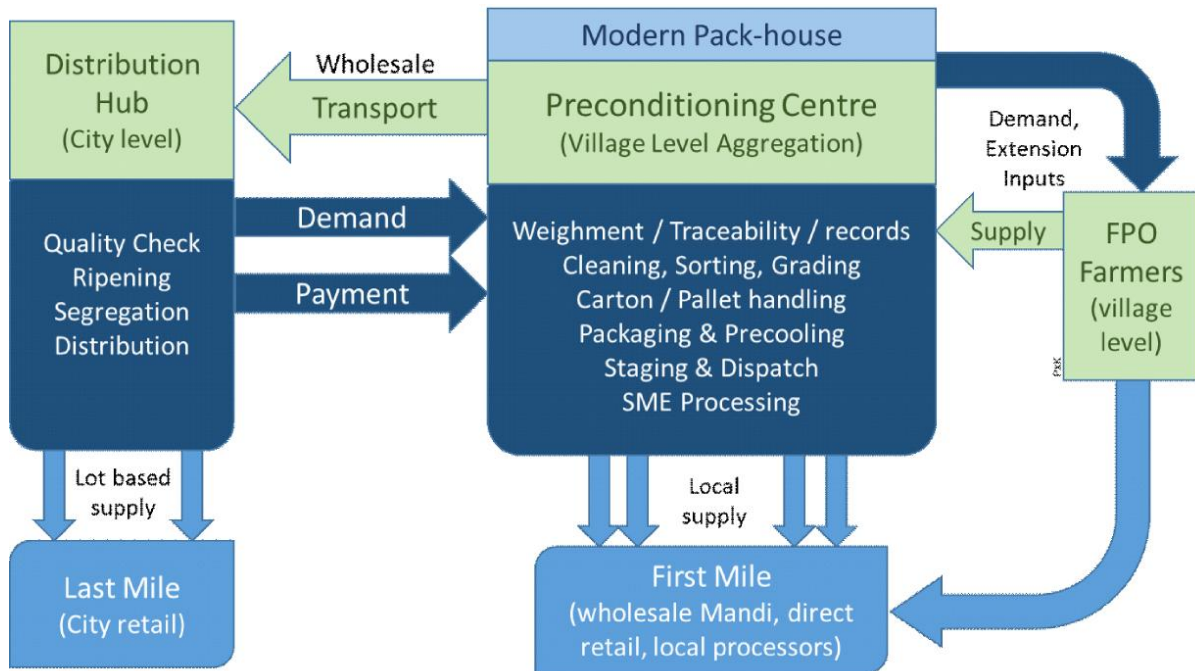
- xi. Strengthening FPC by providing capacity building training for Commercial negotiation, project management for Post-harvest infrastructure, best practices in handling of produce& Post Harvest Management.**
- xii. Each FPC should be integrated with e-NAM for getting fair price of its produce.**
- xiii. The FPC should be given seed and fertilizer dealership on the priority basis and should be treated at par with co-operatives for this purpose.**

All above points is aimed towards strengthening Farmer Producer Organizations/Companies (FPO/C) and will facilitate improving marketing of vegetables.

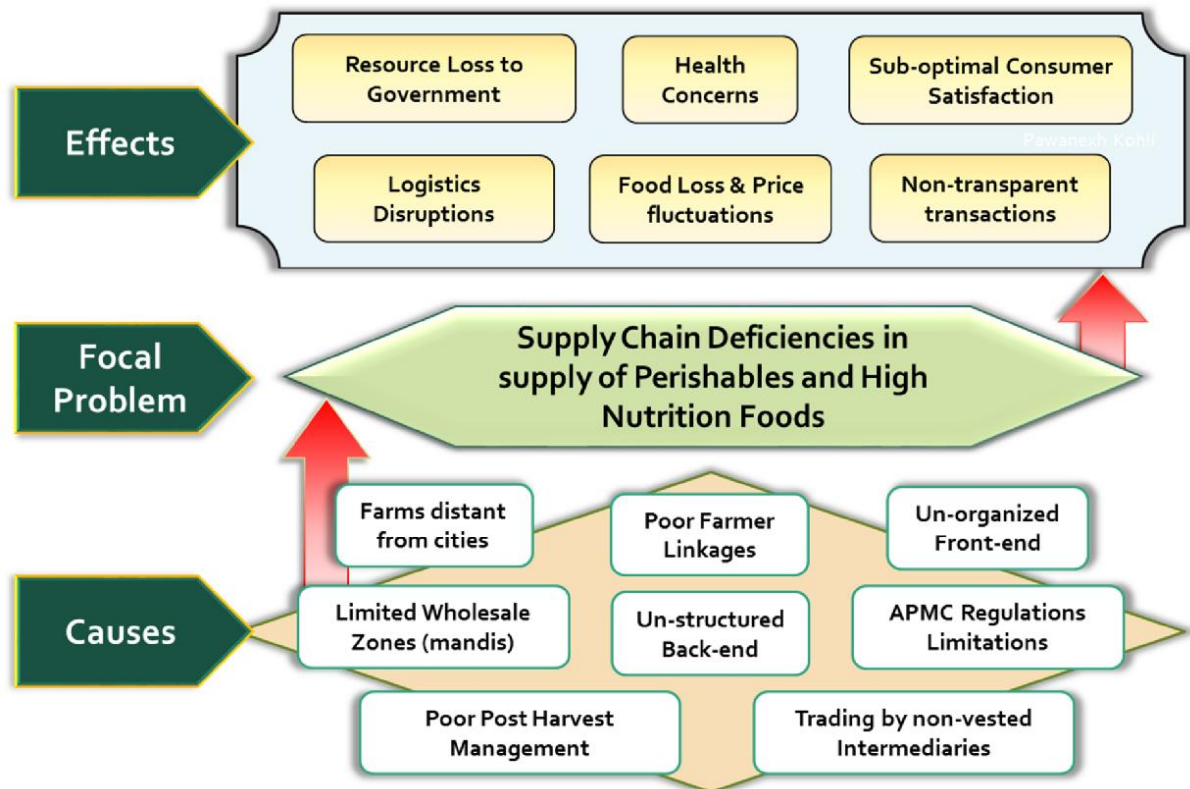


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FPO Model for Marketing Operations



Farmers associate with preconditioning centres for long harvest-to-sale cycle. Precooled produce is dispatched to distant DC and short cycle volume is supplied to local mandis or retail. SME based processing is also supported.



Typical Challenges

Typical Demand mapping from major cities - for select crops

Urban Cluster	Fruits & Vegetables	Population (2014)	Per-Capita Consumption (monthly kgs)	Monthly Demand (monthly throughput needed in tons)
Delhi	Apple	17421947	0.352	6133
Delhi	Grapes		0.234	4077
Delhi	Orange		0.613	10680
Delhi	Mango		0.449	7822
Delhi	Banana		0.635	11063
Delhi	Okra		0.299	5209
Delhi	Tomato		1.03	17945
Delhi	Cauliflower		0.55	9582
Delhi	Cabbage		0.318	5540
Delhi	Carrot		0.438	7631
Delhi	Potato		1.981	34513
Delhi	Brinjal		0.303	5279
Mumbai	Apple	12600973	0.871	10975
Mumbai	Grapes		0.301	3793
Mumbai	Orange		0.723	9111
Mumbai	Mango		0.752	9476
Mumbai	Banana		0.954	12021
Mumbai	Okra		0.366	4612
Mumbai	Tomato		0.87	10963
Mumbai	Cauliflower		0.394	4965
Mumbai	Cabbage		0.325	4095
Mumbai	Carrot		0.254	3201
Mumbai	Potato		1.122	14138
Mumbai	Brinjal		0.341	4297
Ahmedabad	Apple	6617331.6	0.723	4784
Ahmedabad	Grapes		0.258	1707
Ahmedabad	Orange		0.582	3851
Ahmedabad	Mango		0.55	3640
Ahmedabad	Banana		0.73	4831
Ahmedabad	Okra		0.321	2124
Ahmedabad	Tomato		1.11	7345
Ahmedabad	Cauliflower		0.366	2422
Ahmedabad	Cabbage		0.454	3004
Ahmedabad	Carrot		0.251	1661
Ahmedabad	Potato		2.166	14333
Ahmedabad	Brinjal		0.539	3567
Jaipur	Apple	3827061	0.386	1477
Jaipur	Grapes		0.743	2844
Jaipur	Orange		0.823	3150

Urban Cluster	Fruits & Vegetables	Population (2014)	Per-Capita Consumption (monthly kgs)	Monthly Demand (monthly throughput needed in tons)
Jaipur	Mango		0.849	3249
Jaipur	Banana		0.643	2461
Jaipur	Okra		0.376	1439
Jaipur	Tomato		1.18	4516
Jaipur	Cauliflower		0.431	1649
Jaipur	Cabbage		0.431	1649
Jaipur	Carrot		0.553	2116
Jaipur	Potato		1.95	7463
Jaipur	Brinjal		0.206	788
Bengaluru	Apple	10756171	0.871	9369
Bengaluru	Grapes		0.5	5378
Bengaluru	Orange		0.396	4259
Bengaluru	Mango		1.075	11563
Bengaluru	Banana		1.02	10971
Bengaluru	Okra		0.245	2635
Bengaluru	Tomato		1.12	12047
Bengaluru	Cauliflower		0.272	2926
Bengaluru	Cabbage		0.282	3033
Bengaluru	Carrot		0.352	3786
Bengaluru	Potato		0.533	5733
Bengaluru	Brinjal		0.317	3410
Hyderabad	Apple	15178896	0.37	5616
Hyderabad	Grapes		0.213	3233
Hyderabad	Orange		0.434	6588
Hyderabad	Mango		0.907	13767
Hyderabad	Banana		0.915	13889
Hyderabad	Okra		0.409	6208
Hyderabad	Tomato		1.4	21250
Hyderabad	Cauliflower		0.256	3886
Hyderabad	Cabbage		0.266	4038
Hyderabad	Carrot		0.201	3051
Hyderabad	Potato		0.699	10610
Hyderabad	Brinjal		0.391	5935
Chennai	Apple	4752390	0.536	2547
Chennai	Grapes		0.189	898
Chennai	Orange		0.448	2129
Chennai	Mango		0.928	4410
Chennai	Banana		0.989	4700
Chennai	Okra		0.306	1454
Chennai	Tomato		1.234	5864

Urban Cluster	Fruits & Vegetables	Population (2014)	Per-Capita Consumption (monthly kgs)	Monthly Demand (monthly throughput needed in tons)
Chennai	Cauliflower		0.281	1335
Chennai	Cabbage		0.269	1278
Chennai	Carrot		0.324	1540
Chennai	Potato		0.612	2908
Chennai	Brinjal		0.33	1568
Kolkata	Apple	7875849	0.382	3009
Kolkata	Grapes		0.231	1819
Kolkata	Orange		0.646	5088
Kolkata	Mango		0.781	6151
Kolkata	Banana		0.576	4536
Kolkata	Okra		0.398	3135
Kolkata	Tomato		0.412	3245
Kolkata	Cauliflower		0.689	5426
Kolkata	Cabbage		0.687	5411
Kolkata	Carrot		0.249	1961
Kolkata	Potato		4.15	32685
Kolkata	Brinjal		0.628	4946
Guwahati	Apple		1247917	0.366
Guwahati	Grapes	0.365		455
Guwahati	Orange	0.157		196
Guwahati	Mango	0.895		1117
Guwahati	Banana	0.633		790
Guwahati	Okra	0.467		583
Guwahati	Tomato	0.523		653
Guwahati	Cauliflower	0.664		829
Guwahati	Cabbage	0.64		799
Guwahati	Carrot	0.302		377
Guwahati	Potato	2.222		2773
Guwahati	Brinjal	0.506	631	

NSSO data extracted from AICIC2015-NCCD

Crop specific FPOs can plan operations to target wholesale into the select cities to cater to above table demand or throughput calculated in tons per month.

Annexure-2

FPO wise area & crop details for linking FPOs to F&V market in DELHI-NCR

Inputs from SFAC

SN	State Name	FPO Name	Major Crops	Crop wise			Existing market channel for the crop produced	Distance of production cluster from Delhi	Contiguous land available
				Area (acre)	Production (tons)	Productivity (ton/acre)			
1	Delhi	Krishak Bharti Farmer Producer Company	dhaniya	150 acre	600-800	3-4 ton /acre in rain and 8 ton/ acre in winter	Farmers are marketing individually through Mandis and Residential Welfare Associations	14 km	20,000 acre
			pudina	4 acre					
			palak	2500 acre	5000 to 30000 MT	2 ton/ acre in rain, 12 ton/ acre in winter			
			radish	1500 acre	6000 to 18000 MT	4 ton/ acre in rainy season , 12ton/acre in winter			
			knol-khol	30 acre	240 MT	8			
			turnip	150 acre	900 to 2550 MT	6-17			
			MUSTARD	100 acre	600 to 1500 MT	6-15			
			cabbage	100 acre	2000 to 4000 MT	20-40			
			broccoli	40 acre	400 MT	10			
2	Haryana	Karnal Vegetable Producer Company	potato				140 km	80% contiguous land	
			tomato						
			capsicum						
3	Haryana	Kurukshetra Vegetable Producer Company	potato	1000 acre	7000-12000	7-12 t/acre	individually to Mandis	250 km	25 km radius from FPO office
			tomato	700 acre	8750	12.5 t/acre			
			onion	1000 acre	7000-9000	7-9 ton/ acre			
			peas	700 acre	2100	3 ton/ acre			
			carrot	1000 acre	4000-7000	4-7 ton/ acre			
4	Haryana	Mewat Vegetable Farmers Producer	Carrot			Residential societies and mandi	80 km	80% of land is contiguous	
			Tomato		5000 ton				

SN	State Name	FPO Name	Major Crops	Crop wise			Existing market channel for the crop produced	Distance of production cluster from Delhi	Contiguous land available
				Area (acre)	Production (tons)	Productivity (ton/acre)			
		Company Limited	Brinjal						
			Bottle gourd						
			Onion		5000 ton				
			Sponge Gourd						
5	Himachal Pradesh	Solan Sirmour Kisaan Samridhi Producer Company Ltd	Tomato	550	6967	12.67	transporters procure the produce directly from farm and purchase it on vey nominal prices	350 km	900ha in 70 villages. More than 50% contiguous
			Capsicum	143	725	5.07			
			Chilli	178	585	3.29			
			pea	NA					
6	Himachal Pradesh	Dharampur Vegitable Producer Company Limited	Tomato	585	1638	2.8	NIL	400 km	700 acre
			Cabbage	37.5	54	1.44			
			Cauliflower	80	246.4	3.08			
			French bean	12.5	12.5	1			
			Other crops	1025	10127	9.88			
7	Himachal Pradesh	Mashobra Vegitable Producer Company Limited	Peas	100	200	2	NIL	480 km	300 acre
			Cabbage	75	225	3			
			Patato	137.5	357.5	2.6			
			Cauliflower	225	675	3			
			French bean	112.5	225	2			
			Tomato	87.5	227.5	2.6			
8	Himachal Pradesh	Saindhar Producer Company Limited	Ginger	505	2020	4	NIL	550 km	1000 acre
			tomato	505	30300	60			
			garlic	267.5	74.9	0.28			
			potato	100	200	2			
			onion	125	280	2.24			
			beans						
			Other crops						
9	Punjab	Sangrur Vegetable Producer Company Ltd.	cucumber			30-35 ton/ acre	direct marketing residential societies	350 km	150-200 acre
			cauliflowetr			9 ton/ acre			
			pea			60 qtl/acre			
			coriander			60 qtl/acre			
			cabbage			13 ton/ acre			
10	Rajasthan	Bassi Kisan Agro Producer Company Ltd.	tomato	300 acre	12000 to 15000	40-50	individual marketing	330 km	No idea how much is contiguous.
			chilli	100 acre	2000 to 2200	20-22 t/ acre			

SN	State Name	FPO Name	Major Crops	Crop wise			Existing market channel for the crop produced	Distance of production cluster from Delhi	Contiguous land available
				Area (acre)	Production (tons)	Productivity (ton/acre)			
			okra	50 acre	600	12 ton / acre		Total area under FPO cultivation is 1500 ha	
			onion	50 acre	2000	40ton / acre			
			cabbage	10-20 acre		no surplus			
			taro	100 acre	2000	20 ton / acre			
			lauki	100 acre	2000 to 2200	20-22			
11	Rajasthan	Behrod Bansur Agro Veg Producer Company Ltd	Tomato	50 acre	2500	50 ton / acre	individually to Mandis	133 km	Cant say how much is contiguous.
			Cauliflower	60 acre	1500	25 ton / acre			
			Chilly	40 acre	600	15 ton / acre			
			Lady Finger	20 acre	300	15ton / acre			
			Carrot	500 acre	6000	12 ton / acre			
12	Uttar Pradesh	Kashi Vishwanath Farmer Producer Company Ltd	Potato	600	1.16		Adhitias (Mandi),whole seller, retailer, vegetable thela/ van, consumer	720 km	20-30 ha
			Tomato		2.373				
			Lady Finger		1.14				
			Cauli Flower		4.995				
			Cabbage		1.475				
			Chilly		0.378				
			Brinjal		1.24				
			Bottle Gourd		2.25				
			Pea		0.57				
			Ridge Gourd		1.75				
			Onion		0.242				
			Cucumber		1.26				
			Raddish		0.935				
13	Uttar Pradesh	Rameshwar Farmer Producer Company Ltd	Onion	605	0.242		Adhitias (Mandi),whole seller, retailer, vegetable thela/ van, consumer	700 km	30-40 ha
			Cucumber		1.16				
			Raddish		1.035				
			Tomato		2.52				
			Lady Finger		1.25				
			Cauli Flower		4.995				
			Cabbage		2.075				
			Chilly		0.378				
			Brinjal		1.24				
			Bottle Guard (Lauki)		2.25				
			Pea		1.257				

SN	State Name	FPO Name	Major Crops	Crop wise			Existing market channel for the crop produced	Distance of production cluster from Delhi	Contiguous land available
				Area (acre)	Production (tons)	Productivity (ton/acre)			
			Ridge Gourd		1.75				
			Onion		0.242				
			Cucumber		1.26				
			Raddish		0.935				
14	Uttar Pradesh	Gosai Ganj Kisan Producer Company Limited	wheat	1000 acre		4 ton / acre		550 km	10-15 acre
			pea	200 acre		1 ton / acre			
			mustard	500 acre		1-2 ton / acre			
			paddy	800 acre		4-5 ton / acre			
			banana	150 acre	40-50				
			potato	800 acre	16000	20 ton /acre			
			vegetables	1200 acre	1600 qtl	1.3ton / acre			
15	Uttar Pradesh	Naveen Kisan Producer Company Limited	Wheat	225				515 km	20-25 acre
			Pea	25					
			Mustard	37.5					
			Paddy	200					
			Banana	100					
			Potato	87.5					
			Cucurbit	50					
16	Uttar Pradesh	Muzaffarnagar Kissan Producer Company Ltd	Sugarcane	4000				150 km	
			paddy	170					
			urad	37					
17	Rajasthan	BorajKisan Agro Producer Company Ltd.	Watermelon	200 acre	40000	200 ton / acre		450 km	1500 acre
			Pea	300 acre	1800-2100	6-7 ton / acre			
			white onion	400 acre	60000	150 ton / acre			
			tinda	50 acre	200-250	4-5 ton / acre			
			Tomato	100 acre	800-900	8-9 ton / acre			
18	Rajasthan	Jaipur Veg Agro Producer Company Ltd	Wheat	150 acre	300	2 ton / acre	Direct marketing large companies	200 km	100 acre
			Bajra	250 acre	375	1.5 ton / acre			
			Pea	200 acre	500	2.5 ton / acre			

The FPOs which are located at a distance of more than 12 hours travel from Delhi (as target market), should preferably be linked through infrastructure such as modern pack-house with precooling facility, a staging cold room and reefer vehicles. In addition, FPOs are supposed to have professional management and therefore traceability and other best practices can be developed to make each FPO a centre of excellence in each crop type.

FPO wise infrastructure in hand (*as informed by FPO*)

SN	State Name	FPO Name	Infrastructure available with FPO											
			Collection center	Pack-house	Cold storage	Primary preconditioning	Reefer van	Ripening chamber	Pre-cooler	Low cost onion storage	Retail outlet	Apni-mandi	Mobile vending cart	Any other
1	Delhi	Krishak Bharti Farmer Producer Company	No	No	No	No	No	No	No	No	No	Only space is available	No	No
2	Haryana	Karnal Vegetable Producer Company												
3	Haryana	Kurukshetra Vegetable Producer Company	No	No	No	No	No	No	No	No	No	No	No	No
4	Haryana	Mewat Vegetable Farmers Producer Company Limited	1											
5	Himachal Pradesh	SolanSirmour KisaanSamridhi Producer	No	No	No	No	No	No	No	No	No	No	No	No

SN	State Name	FPO Name	Infrastructure available with FPO												
			Collection center	Pack-house	Cold storage	Primary preconditioning	Reefer van	Ripening chamber	Pre-cooler	Low cost onion storage	Retail outlet	Apni-mandi	Mobile vending cart	Any other	
		Company Ltd													
6	Himachal Pradesh	DharampurVegetable Producer Company Limited	2 Nos	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	DHARAMPUR MANDI	NIL	NA
7	Himachal Pradesh	MashobraVegetable Producer Company Limited	2 Nos	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
8	Himachal Pradesh	Saindhar Producer Company Limited	2 Nos	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
9	Punjab	Sangrur Vegetable Producer Company Ltd.	No	No	No	No	No	No	No	No	No	No	No	No	No
10	Rajasthan	BassiKisan Agro Producer Company Ltd.													
11	Rajasthan	BehrodBansur Agro Veg	No	No	No	No	No	No	No	No	No	No	in process	No	No

SN	State Name	FPO Name	Infrastructure available with FPO											
			Collection center	Pack-house	Cold storage	Primary preconditioning	Reefer van	Ripening chamber	Pre-cooler	Low cost onion storage	Retail outlet	Apni-mandi	Mobile vending cart	Any other
		Producer Company Ltd												
12	Uttar Pradesh	Kashi Vishwanath Farmer Producer Company Ltd	4-5 in each FPO	No	No		No	No	No	No	KVFPCL-2 , RFPCL-2	Both FPO work as commission agent in different mandi	no	
13	Uttar Pradesh	Rameshwar Farmer Producer Company Ltd	4-5 in each FPO	No	No		No	No	No	No	KVFPCL-2 , RFPCL-2	Both FPO work as commission agent in different mandi	no	
14	Uttar Pradesh	GosaiGanjKisan Producer Company Limited		4	3									vermibed 26
15	Uttar Pradesh	Naveen Kisan Producer Company Limited												
16	Uttar Pradesh	MuzaffarnagarKissan			160-mt.									

SN	State Name	FPO Name	Infrastructure available with FPO											
			Collection center	Pack-house	Cold storage	Primary preconditioning	Reefer van	Ripening chamber	Pre-cooler	Low cost onion storage	Retail outlet	Apni-mandi	Mobile vending cart	Any other
		Producer Company Ltd												
17	Rajasthan	BorajKisan Agro Producer Company Ltd.								4 to 5				
18	Rajasthan	Jaipur Veg Agro Producer Company Ltd	Store used as collection center	No	No	No	No	No	No	No	No	No	No	No

Majority of FPOs do not have recourse to collection & packaging centres, pre-cooler or transport linkage. The first stage of preconditioning produce for market is therefore not enabled. Unless the entire output is for local consumption / markets, the FPOs need to be empowered with long distance market linkage through cold-chain.

FPO wise infrastructure demand (as requested by the FPO)

SN	State Name	FPO Name	Infrastructure requirement requested by FPO											
			Collection centre	pack house	Cold storage	Primary preconditioning	Reefer van	Ripening unit	Pre-cooler	Low cost onion store	Retail outlet	Apni-mandi	Mobile vending	Any other
1	Delhi	Krishak Bharti Farmer Producer Company	1	1	1	1					1			
2	Haryana	Karnal Vegetable Producer Company												
3	Haryana	Kurukshetra Vegetable Producer Company	2	5000 MT capacity	1	1	4					1	2	5000 crate
4	Haryana	Mewat Vegetable Farmers Producer Company Limited		1	1									Agri-business manager
5	Himachal Pradesh	SolanSirmourKisanSamridhi Producer	8 to 10 are required as clusters	8 to 10	1 to 2	tomato and mango								

SN	State Name	FPO Name	Infrastructure requirement requested by FPO											
			Collection centre	pack house	Cold storage	Primary preconditioning	Reefer van	Ripening unit	Pre-cooler	Low cost onion store	Retail outlet	Apni-mandi	Mobile vending	Any other
		Company Ltd	cover 70 km radius			processing unit								
6	Himachal Pradesh	DharampurVegetable Producer Company Limited	2 NOS	2 NOS	NO	YES	YES		NO	YES	2 NOS	Yes we need a self FPOmandi	2 NOS	Need staff for marketing and for outlet stores/ godowns
7	Himachal Pradesh	Mashobra Vegetable Producer Company Limited	2 NOS	2 NOS	NO	YES	YES		NO	YES	2 NOS	Yes we need a self FPOmandi	2 NOS	Need staff for marketing and for outlet stores/ godowns
8	Himachal Pradesh	Saindhar Producer Company Limited	2 NOS	2 NOS	NO	YES	YES		NO	YES	2 NOS	Yes we need a self FPOmandi	2 NOS	Need staff for marketing and for outlet stores/ godowns
9	Punjab	Sangrur Vegetable Producer Company Ltd.	3 to 4 collection centre	small pack house for local market			4 to 5		1				1	crates
10	Rajasthan	BassiKisan Agro Producer	1	2	2 to 3									

SN	State Name	FPO Name	Infrastructure requirement requested by FPO											
			Collection centre	pack house	Cold storage	Primary preconditioning	Reefer van	Ripening unit	Pre-cooler	Low cost onion store	Retail outlet	Apni-mandi	Mobile vending	Any other
		Company Ltd.												
11	Rajasthan	BehrodBansur Agro Veg Producer Company Ltd	1	1										
12	Uttar Pradesh	Kashi Vishwanath Farmer Producer Company Ltd	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
13	Uttar Pradesh	Rameshwar Farmer Producer Company Ltd	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
14	Uttar Pradesh	GosaiGanjKisan Producer Company Limited	4	10										
15	Uttar Pradesh	Naveen Kisan Producer Company Limited												
16	Uttar Pradesh	MuzaffarnagarKissan Producer												

SN	State Name	FPO Name	Infrastructure requirement requested by FPO											
			Collection centre	pack house	Cold storage	Primary preconditioning	Reefer van	Ripening unit	Pre-cooler	Low cost onion store	Retail outlet	Apni-mandi	Mobile vending	Any other
		Company Ltd												
17	Rajasthan	BorajKisan Agro Producer Company Ltd.	1	1	1									
18	Rajasthan	Jaipur Veg Agro Producer Company Ltd	3	2	3	1	1					2	1	

It is notable that many FPOs are realising the need for pack-houses, however the advantage of modern pack-house with pre-cooler is seemingly, not fully understood. Similarly, the requirement of reefer vans is not integrated with preconditioning of produce through use of pre-coolers. Individual FPOs may require to be guided on their target market and the linked infrastructure tools to service the markets.