Food for Thought
Policy Options for India's Food Processing Industry

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ISTIP (Indian S&T and Innovation Policy): First Study of its kind focusing on various dimensions of innovation activity in India; aiming at providing valuable inputs for S&T and Innovation decision making.

Contents

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1. Introduction

Food today, is a complex business. Food and food processing in a country that is home to the richest and most diverse staples, culinary cultures and largest number of hungry adults and malnourished children in the world, spawn multifarious problem statements, analyses, and solutions. Unemployment, unfair terms of trade, poverty and hunger in rural and agrarian households who are producers of the raw material for the food processing industries (FPI), pose macro-economic questions about the policy goals, choice of policy instruments and ways of implementing the policy instruments. The significant increase in disposable incomes of the middle class, willing and eager to buy more packaged foods and global exports will ensure the expansion of the FPI. The Government of India, its Ministry of FPI in particular, has declared its policy to facilitate exports of food products, welcome foreign direct investment (FDI) and technology transfer to enhance the competitiveness of the industry. The policy goal is also to ensure that the growth of FPI will create massive number of rural jobs, and increase the incomes of farmers.

This policy bulletin presents a brief overview of the FPI policy goals and objectives. Will they help achieve the targeted volumes or values of processed food or rural employment? A key policy lesson is that the extant policy that promotes capital intensive export oriented processing firms is likely to restrict the growth and expansion of FPI, limit employment opportunities and worsen national food and nutrition security status. The bulletin proposes that India should seek an alternative knowledge-policy paradigm, rooted in the rich and diverse agri-food systems in the country, using business models and entrepreneurial opportunities for economically and ecologically sustainable food processing.

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A brief overview of the FPI is given in Section 2 covering both the unorganized and organized factory production. Here, we note that only a minor fraction of India's massive agricultural (primary sector) production is processed. In almost all the segments, it is the unorganized processing and marketing activities, with relatively short value-chains that dominate. Section 3 explores how the national FPI policy goals - to enable value-added employment and higher integration with agriculture and rural incomes - are achieved. In Section 4 we present four key segments of India's FPI based on their size in the overall FPI (number of factories, value added, and employment) and their predominantly rural locations and skills. Section 5, as concluding, revisits the framing of the FPI policy, and presents policy options that could enable a different but massive expansion of the FPI towards ensuring more jobs, better incomes and, importantly, nutritional security.

2. FPI Policy Goals and Contexts

Through planned investments in industrialization, economic liberalization and globalization, and increasing disposable incomes with the middle class the FPI has emerged as a leading sector (see IBEF, 2006).

Table 1: Contribution of Food Processing Industries to Gross Domestic Product

(Rs. Crore in constant (2004-05) price)

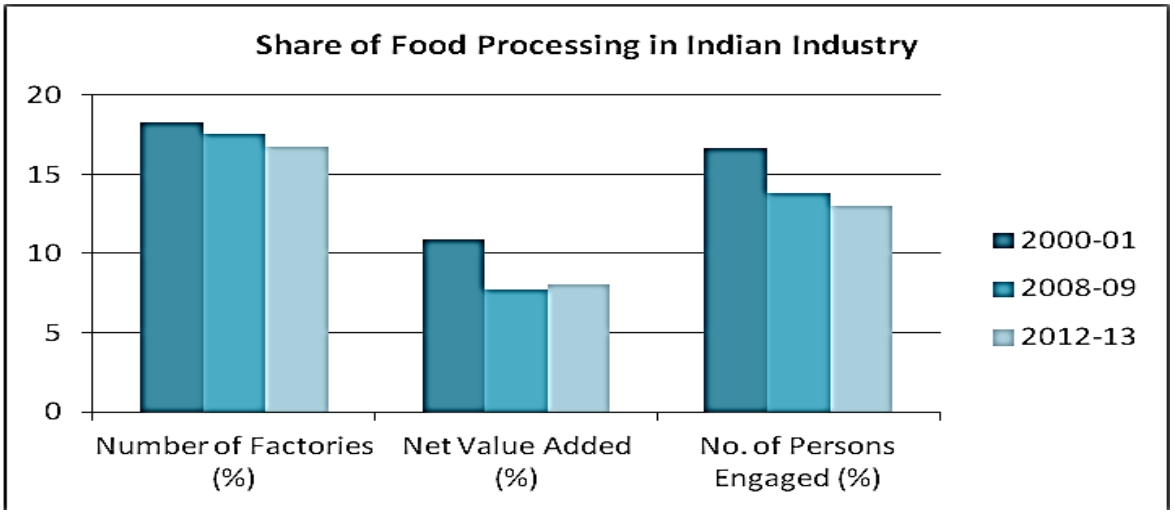
Sl. No.	Description	2008-09	2009-10	2010-11	2011-12	2012-13	
	GDP at Factor Cost, of which	41,58,676	45,16,071	49,18,533	52,47,530	54,82,111	
1	GDP-Agriculture*	5,88,757 (14.16)	5,92,110 (13.11)	6,47,305 (13.16)	6,82,016 (13.00)	6,90,646 (12.60)	
2	GDP-Manufacturing*	6,56,302 (15.78)	7,30,435 (16.17)	7,95,152 (16.17)	8,54,098 (16.28)	8,63,876 (15.76)	
3	GDP-FPI*	60,378 (1.5)	58,752 (1.3)	67,508 (1.4)	82,063 (1.6)	84,522 (1.5)	
	Growth (%)						**AAGR $**
4	GDP at Factor Cost	6.7	8.6	8.9	6.7	4.5	7.1
5	GDP-Agriculture*	-0.1	0.6	9.3	5.4	1.3	3.3

6	GDP: Manufacturing	4.3	11.3	8.9	7.4	1.1	6.6
7	GDP-FPI	5.3	-2.7	14.9	21.6	3.0	8.4
	Share of FPI in GDP (%)						**Average**
8	GDP FPI as a Share of GDP in Agriculture*	10.3	9.9	10.4	12.0	12.2	11.0
9	GDP FPI as a Share of GDP in Manufacturing	9.2	8.0	8.5	9.6	9.8	9.0

Source: MoFPI (2014: 13).
Note _* Excludes Forestry & Logging; $: Five Year Average Annual Growth Rate
In parentheses – Estimated % share in National GDP

The formal organized FPI contributed Rs. 845.22 billion to India's GDP in 2012-13 (at 2004-05 prices) (Table 1). The industry has grown at an average annual growth rate of 8.4 percent over the past five years. In the past three years (2010-13) the FPI accounted for roughly 1.5 percent of the national GDP. Its share in manufacturing GDP, at 9.8 percent in 2012-13, has shown a steady increase over the past few years. But it has declined sharply from the share it held during the late 1990s (20-22 percent) and in 2000-01 (11 percent) in manufacturing GDP.

Figure 1: Declining Share of FPI in Indian Industry



Source: estimated from ASI (various years)

This shrinking of FPI in the overall manufacturing sector GDP over the last decade applies to the total number of factories, net value added and number of people employed in the factory sector (Figure 1). It may be a welcome indicator of the growth of other manufacturing sub-sectors; but it poses some grave policy concerns. First, this shrinking share of FPI in the manufacturing is

accompanied by a decline in the number of people employed in the sector, and an increase in the share of tertiary processing or high value-added bakery and confectionary goods relative to the other segments of the FPI. Second, this shrinking has taken place when the stunning agricultural GDP growth rates, at an average of 4.06 percent per annum during the XI Five Year Plan period, is driven largely by the growth rates of commodity prices and not agricultural production or productivity (Chand, 2014). Third, the growth of the FPI is increasingly seen as an export target. But processed food exports account only for 13.4 percent of agricultural exports (APEDA database), and the demand for unprocessed bulk food items from India is increasing. The increasing integration of Indian agriculture with the global market is evident in the increasing share of agricultural trade from 5 percent (1990-91) to 18 percent (2011-12) in agricultural GDP (Hoda and Gulati, 2013).

Opportunities for the agrarian and rural poor to participate and gain from the FPI are many (Singh, 2012). Marginal and small farmers operating nearly 85 percent of all operational holdings and accounting for 44 percent of the cultivated area in the country, face a steep increase in input costs, stagnating or rapidly declining growth rates in yields, and increasing market and weather fluctuations. Aggregate demand constraints due to limited purchasing power of farmers and rural labour, and the declining share of agricultural GDP in the economy (down to 13 percent in 2012-13) are an economic reality. This is likely to reinforce the relative dissociation between industry and agriculture (Chandrasekhar, 2011) that happened because of the technological and institutional choices made in India's development trajectory (Raina, 2015). The macro-economic logic that drives India's growth trajectory is that it would *strengthen the backward linkages with farm incomes and agriculture*, and *encourage private capital investment and employment* (MoFPI, 2014). We explore if this logic holds or stands thwarted.

2.1. Policy Goals and Instruments:

The central Ministry of FPI was established in July 1998 to formulate and implement policies and plans to achieve the following objectives:

- *Better utilization and value addition of agricultural produce for enhancement of income of farmers;*
- *Minimizing wastage at all stages in the food processing chain by the development of infrastructure for storage, transportation and processing of agro-food produce;*
- *Induction of modern technology into the food processing industries from both domestic and external sources;*
- *Encourage R&D in food processing for product and process development and improved packaging;*
- *Provide policy support, and support for creation of infrastructure, capacity expansion/ Upgradation and other supportive measures form the growth of this sectors;*
- *Promote export of processed food products.*

(Source: MoFPI, website)

Functionally, the MoFPI combines 'policy formulation and execution, and facilitation of a conducive environment' for the industry. For a country with several diverse food systems, it is not surprising that many State Governments have their own ministries or Department of Industries and Commerce or the Agro-Industries Corporation or Industrial and Infrastructural Development Corporation, to spearhead FPI.

However, it was the enactment of a Food Law that laid the ground for prevalent policies, plans, and investments in the sector. Following the demand in 1998, from the Prime Minister's Council on Trade and Industry for a unified single regulatory authority for food, The Food Safety and Standards Act came into force in 2006, with the following twin objectives:

(i) To introduce a single statute relating to food
(ii) To provide for scientific development of the food industry.

This legal requirement, implemented on 5th August 2011, meant that the FPI was now governed by scientifically established regulations and processes. With provisions for quality inspections and phytosanitary requirements, the Act had thousands of formal FPI units and millions of informal food processors and retailers (including millions of street vendors) worrying about its implications for their businesses. The new Act overruled the erstwhile food laws that spanned nine ministries, diverse locational and production details incorporated or alluded to in these different standards. This integration and uniform standards did give rise to many debates. But it is the standardization (criteria and parameters) and regulation, enabled by the Act that ensured an increase in FDI in the industry and greater demands for support from the state. Among the policy demands made by the industry are

(i) tax breaks,
(ii) supply of cost effective technologies, skilled and semi-skilled workforce, public infrastructure, financial incentives like subsidies, cheap credit and price support,
(iii) assured supply of quality raw material (FICCI, 2010).

Some concerns about alignment of Union and State level policy instruments are also raised. These demands are repeated in several reports authored and led by industry, consultancy firms, as well as the Planning Commission, National Manufacturing Competitiveness Council (NMCC), State departments, and even some academics (See, Mukherjee et al, 2013, NPC, 2010; IBEF, 2006; FICCI, 2010; Planning Commission, 2011; Singh et al 2012). However, there are two demands from the corporate sector:

(i) for maximum value-addition within the country, and
(ii) appropriate business models for different agro-ecological zones and production systems.

These are the only two that acknowledge the employment and value creation potential as well as the biological production base and agro-ecological features that are central to the FPI, or, rather the human skills and raw material supply provided by agriculture which sustains the FPI.

At the macro level, when the industrial commodity basket shifted in the 1980s, from agro-based to chemical and metal based goods, industry witnessed a "relative degree of independence" from the pace and content of agricultural growth (Chandrasekhar, 2011: 215). India's industrial sector has never really managed to come out of the aggregate demand constraint with an agriculture sector that could not mobilize an increase in real incomes and value-addition to break out of the constraint. India's food processing sector offers the economy the opportunity to push agriculture and rural India out of this aggregate demand constraint, by enabling more jobs and more value-added per rural worker, especially, female.

This brief section presented two defining contexts within which the FPI policy operates:

(i) The declining share of FPI in India's industrial GDP, accompanied by a relative distancing from the agriculture sector
(ii) The increasing policy focus on regulations and laws, and FDI for the formal organized factory sector.

It is doubtful that the prevalent policies will allow growth of value-addition, investment and employment in FPI and build the backward linkages that can support farm incomes and the rural economy

3. FPI in India's Food Processing Sector(s)

The factory sector or formal organized FPI is a small fraction of India's food processing sector. In this section we present reasons why the policy and investments in the food processing sectors need to think and look beyond the organized factory sector, and (taking cue from FICCI, 2010) *identify different agri-business models* for India's rich and diverse agro-climatic zones, food production and processing systems.

Very little data are available on the volume of food production that is processed – in the organized and unorganized sectors. Available estimates indicate that about 2 percent of the total fruit and vegetable produce in the country is processed (NPC, 2010). Thailand, Malaysia, Indonesia, and several developed western countries process anywhere between 25 percent and 80 percent of their fruit and vegetable production (NPC, 2010 and IBEF, 2006). The share of total produce processed in India's dairy segment is 35-37 percent, of which more than half is processed in the unorganized sector (ibid).

India's food processing takes place mainly in the small units – registered and unregistered. The number of registered FPI units in the factory sector was 26,219 in 2007-08, while the number of food processing enterprises in the MSME sector was 25.12 lakhs in 2006-07 (MoFPI, 2014). Of the latter, the unregistered enterprises accounted for 91 percent of the total food processing. Another estimate puts over 42 percent of all processed food output coming from the unorganized sector, about 25 percent from the organized sector and the rest from various categories of small producers (Singh et al, 2012). Approximately 75 percent of the market of processed foods is also in the unorganized sector (ibid; NPC, 2010).

Table 2: India's Unorganized FPI - Employment and Enterprises (2005-06)

Location / Type of Enterprise	Urban	Rural	All -India
OAME			
Average number of workers per enterprise	2	2	**2**
Estimated number of enterprises	346262	1777603	**2123865**
NDME			
Average number of workers per enterprise	3	3	**3**
Estimated number of enterprises	149611	185605	**335216**
DME			
Average number of workers per enterprise	9	9	**9**

Estimated number of enterprises	31669	112057	**143726**
All types **Average number of workers per enterprise**	**3**	**2**	**2**
Estimated number of enterprises	**527542**	**2075625**	**2602807**

Source: NSSO 2007, Appendix 1, pp. 42-55.

Note: OAME – Own Account Manufacturing Enterprise, NDME – Non-Directory Manufacturing Enterprise, DME – Directory Manufacturing Enterprise

NIC code 15 here includes food and beverage enterprises.

The 62nd Round of the NSSO estimates that there are 26.03 lakh food processing enterprises in the unorganized sector in India (Table 2). With an average of 2 workers per unit, the total employment in the unorganized FPI is over 52 lakhs; over three times the employment in the organized factory sector FPI. Given that 81.5 percent of the total unorganized food processing units are micro-units, with two employees within the family (OAME), and over 84 percent of these units are in rural India, a majority of these units are also marginal and small farmer households using their own limited resources to add value to local produce (agricultural, horticultural, dairy or fish). The unorganized FPI emerges as a major contributor to rural (agricultural and non-farm) incomes. Clearly, investing in support systems for the unorganized FPI enterprises will go a long way in increasing the employment potential offered by FPI, as well as in forging effective backward linkages with agriculture, in tune with the policy objective of increasing farmers incomes (MoFPI, website).

It is not just the sheer numbers of processing enterprises in the unregistered and informal sector that is neglected within the current policy framework. It is an entire range of processed foods, processing methods and associated knowledge systems that are ignored. Among the perishable food products that are processed in India are fruits and vegetables, milk, meat, fish, cereals and pulses and oilseeds. India's traditional (informal) food processing involves primary, secondary and tertiary processing with women and household based processors, and shelf life of finished products ranging from a few days or months for milk, curd, sweets and savouries, *papads*, salt-dried fish and pickles, to several years for products like oils, fats, cereals, jaggery, spices.

These micro-to-small processing units (cottage and community level to regional level enterprises) use processing methods and technologies of drying and fermenting, unique to each regional food system. A few of these, like semi-processed (kebabs and other meat items, idli-dosa mix, traditional rotis and other breads) and ready to serve (chaach, lassi and other milk products, sweets, rotis/ breads) products have found their own established markets and trusted brand names in specific regions (for example, ID special, Venky's, Green Chick, Gopala, or Bikanerwala). The giants in global food industry (Nestle, Danone, Kellogs, ConAgra) are also entering these markets with the same traditional food products. Pickles and preserves however, continue to be the largest in value and volumes within the fruit and vegetable processing segment, handled almost entirely by unorganized local producers, along with some established Indian brand names (Nilon, Bedekar, Mothers, Ruchi, Priya, Pachranga, Safal, to name a few of the hundreds) that have an established regional demand.

When the organized factory FPI demands investments and tax exemptions for primary, secondary and tertiary processing, it lists massive energy intensive machines and tools (see, Mukherjee et al, 2013: 13). The processes that food is subjected to are mechanical cutting, grading, chilling, freezing, frying, pulping-pasting, homogenizing, etc., involving inputs/additives from chemical industry, packaging industry and service/transport industry (the three main allied industries in FPI). All the food items processed by the unorganized sector and marketed locally, use methods like drying, fermentation, malting, followed by direct consumption or storage, or further processing for enhanced shelf-life with no chemical industry inputs and minimal fossil fuel use for transport. They consume far less energy, and are far more efficient because primary processing does not wait for adequate bulk volumes to arrive to be fed into machines. The primary processing is done locally, by women mainly, as and when local harvest volumes arrive.

The most obvious advantage of the unorganized sector food processing is that the energy use is almost entirely renewable energy- solar and wind, and microbial. The minimal energy use is a constraint in all rural and unorganized sector manufacturing (Das, 2011:215-16). But in the unorganized food processing enterprises, very little (4-7 percent of the total operating expenses) is spent on fuel use. Raw materials account for 79 percent of the total operating expenses in the unorganized food processing enterprises (compared to nearly 85 percent for all unorganized manufacturing) (estimated from NSSO, 2007). Similarly, products and by-products account for over 77 percent of the total value of output (compared to 80 percent for all unorganized manufacturing) (ibid).

The relatively high share of raw material cost in total expenditure and product /byproduct value in total value of output also implies the distribution of incomes – the farmer's share of the ultimate consumer's rupee is very high in the unorganized food processing sector. The same is not true for the organized FPI, where in 2012, raw material costs range from a minimum of 0.43 percent (starches) to over 7 percent (dairy) of operating costs in different segments of the FPI (CMIE 2013). The gross value added (GVA) per worker was Rs. 24,277 (2005-06) in the unorganized FPI compared Rs. 28,631 (2005-06) in the organized FPI (estimated from NSSO 2007 and ASI 2011, Time Series). But this comparison should be seen in the context where the unorganized FPI worker (at an average of 2 workers per enterprise) is often the owner or family member, and those who are farmers too, are also the raw material suppliers to the enterprise.

The current policy framework and investment plans are, specifically, to attract FDI, foreign technology and equipments and grant all facilities including land and water, to global actors in the factory sector. Given that the micro- and small- rural processors and small- and medium- peri-urban processors hardly participate in and gain from these policy instruments, appropriate policy instruments and designs are needed. In the current macro-economic context of aggregate demand constraints, the prevalent policy instruments may work for a few segments and may marginally increase the volumes processed and traded. But they will be highly inadequate to enable a transformation in the scale and scope of the food processing sector.

4. An Overview of the Organized FPI

The recent liberation of the Indian industry from the regulations that reserved certain products to be manufactured exclusively by the micro and small enterprises (MSEs), has been celebrated as a "decent burial for small-scale industry" (Gokarn, S. quoted in Kazmin, 2015). In particular, the reference was to pickles and preserves – a key segment of India's FPI, being moved out of the

restriction of small-scale production. Given the exclusive focus of the current policy regime on capital intensive organized manufacturing, this section will explore the avenues for knowledge and policy interventions. Using a brief analysis of four segments of the FPI, this section presents the opportunities for enhancing employment and value-added within the FPI. That these opportunities are not the ones that receive policy attention and investments is a matter of concern, and demands further knowledge and policy research.

Table 3: Major Segments and Their Share in FPI (2011-12 & 2012-13)

Segments (NIC-2008, 3-Digit Codes)	No. of factories		Gross value added (in Rs. Lakh)		Total employment (in no.)	
	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13
Fruit and veg processing (103)	1078 (3.09)	1110 (3.16)	158514 (2.33)	247297 (3.73)	62448 (3.83)	55090 (3.56)
Dairy products (105)	1653 (4.74)	1695 (4.83)	736030 (10.80)	678071 (10.22)	149775 (9.19)	135108 (8.73)
Grain and milling (106)	19010 (54.50)	18854 (53.72)	1586310 (23.27)	1753113 (26.42)	366500 (22.50)	322849 (20.87)
Bakery and confectionary (107)	8457 (24.24)	8649 (24.64)	2508920 (36.80)	2595389 (39.12)	822043 (50.46)	825285 (53.34)
Processing and Preserving of meat (101)	146 (0.42)	140 (0.40)	97419 (1.43)	141113 (2.13)	20621 (1.27)	22130 (1.43)
Processing and preserving of fish, crustaceans and molluscs and products thereof (102)	390 (1.12)	462 (1.32)	124851 (1.83)	154125 (2.32)	42081 (2.58)	36773 (2.38)
Manufacture of vegetable and animal oils and fats (104)	3394 (9.73)	3312 (9.44)	1245082 (18.26)	861435 (12.98)	121232 (7.44)	111218 (7.19)
Manufacture of prepared animal feeds (108)	755 (2.16)	873 (2.49)	360260 (5.28)	204362 (3.08)	44462 (2.83)	38730 (2.50)
Total Food Processing Industry*	34883 (100)	35095 (100)	6817386 (100)	6634905 (100)	1629162 (100)	1547183 (100)

Source: ASI 2014, 2015 (% share estimated in brackets)
Note: Beverages are not included.

The number of registered factories or processing units (Table 3) is the highest in Grain and Milling (including starch and starch products) and Bakery & Confectionary (including specific sub-

segments) segments of the FPI. Though the ASI, as per the NIC code, places dairy and fruit and vegetable processing as two distinct segments, the MoFPI classifies them under one group. For a deeper analysis of the structure and performance of the organized FPI, we include these two segments, the Fruit & Vegetable processing and Dairy products segments along with the two of the largest segments of Grain and Milling and Bakery and Confectionary.

Together, these four segments cater directly to the consumers. These account for 86 percent of all the operational units, 79.5 percent of the total GVA and 86.5 percent of the employment in the industry in 2012-13 (Table 3). They present a highly diverse set of agro-ecological and socio-economic production and processing systems, are very different across the states, exist in both the organized and unorganized sectors.

4.1. FPI jobs and wages:

Given the MoFPI's stated goal of enhancing employment in the FPI, all the four segments reveal an increase in the number of jobs created over the period 2008-09 to 2011-12 (Table 4). In the grain milling and starch segment, employment growth has been somewhat limited. While the increase in number of workers has been massive in the dairy products segment (52.7 percent), this segment has seen the least increase in wages and salaries per worker (24.82 percent) during 2008-09 to 2011-12.

Table 4: Employment and Wages in the Four Major Segments (2008-09 and 2011-12)

Core Segments of FPI	Employment (% change in no 2008-09 to 2011-12)	Total workers (% change in no. 2008-09 to 2011-12)	Supervisory and managerial (% change in no. 2008-09 to 2011-12)	Unpaid family members, proprietor, etc. (% change of no. s 2008-09 to 2011-12)	Wages and salaries including employers contribution (% change of Rs. Lakhs 2008-09 to 2011-12)	Wages and salaries per worker (% change of Rs. Lakhs 2008-09 to 2011-12)
Fruit and vegetable products	38.8	38.8	27	-39	102	45.9
Dairy products	46.5	52.7	24	-53.8	84	25.82
Grain and milling & Starch and products	5.7	3.6	28.8	-12.3	84.0	74.1
Bakery and Confectionary	36	33.5	35.8	-49	80.5	32.73

Source: estimated from ASI, 2011, 2014

The skill composition of the workforce has undergone a major change during this period, with unpaid family labour declining and supervisory and managerial positions increasing in all the segments (Table 4). While better infrastructure and more efficient technologies may have enabled this change in the employment profile, there is a major increase in the share of the wages and salaries that goes to the skilled or managerial workers, relative to the increase in the wages

of the workers. With a 74 percent increase in the wages and salaries per worker, over a period of four years (2008-09 to 2011-12), it is the grain milling and starch segment that has contributed the most to the workforce and employment.

The grain milling and starch segment is also home to a large proportion of the women workforce in FPI (ASI data). This segment has seen a reduction in the number of women workers (less by 5211) over the period 2008-09 to 2011-12. But it is this segment along with the dairy products segment that account for a third of the total wages and salaries paid to workers in the organized FPI in India. Women's workforce in these two segments (together) account for a fraction (less than 10 percent) of the total women workers in the FPI. It is unlikely that women workers have gained much from the increase in wages and salaries in the FPI. Women workers have increased in absolute numbers in the bakery and confectionary segment; the share of this segment in the total female FPI workforce has also increased. But the share of total FPI wages and salaries accruing to this segment has declined marginally, and thereby indicates a relative decline in the wages received per female worker in the segment. The only segment where women workers seem to have gained in wages is the fruit and vegetable processing segment, where there has been a decline in the number and share of women workers employed, and an increase in the share of the segment in the total wages and salaries in FPI.

Besides this, the share of wages and salaries in total operational expenditure has declined over these three years (2008-09 to 2011-12) against an overall increase the share of raw material, fuel, equipment, and marketing expenditure. The policy goal of increasing rural employment and farmers' incomes through increasing investments in the factory sector food processing does not seem to have been achieved.

4.2. Capital Intensive FPI

The total fixed capital invested in FPI was Rs. 68335 crore (2007-08), rising to Rs. 145038 crore (2011-12). A 51 percent increase in fixed capital (in current prices) over four years, when compared to the 3.56 percent (in fruit and vegetable segment) and 17.7 percent (grain milling and starch) increase in wages and salaries, speaks for itself.

The policy choice is capital intensive and FDI-led FPI. FDI into the FPI sector which was 1.5 percent (Rs. 198.13 crore) of total FDI in 2000-01, shot up to 5.5 percent (Rs. 1036.12 crore) share in 2001-02, and to 17.02 percent (Rs. 25,106.78 crore) share in 2013-14 (MoFPI, website).

Table 5: Capital Investment in the Four Key FPI Segments

Segments	Fixed capital per unit (in Rs. Lakh)		Percentage change in fixed capital per unit (%)	Percentage share of 4 key segments in Total FPI fixed capital
	2007-08	2011-12	2007-08 to 2011-12	(Total of all segments in 2011-12 = 14503825)
Fruits and Vegetables	403.6	469.4	16.3	3.4

Dairy Products	338.6	647.0	91.1	7.3
Grain mill, starch and starch products	55.7	92.3	65.7	12.1
Bakery products*	527.2	764.4	44.9	44.5
Average of the four segments	221.1	324.4	46.9	67.5

*The figure for bakery products also includes sugar, cocoa, chocolate and confectionery, macaroni, noodles, couscous & similar farinaceous products, prepared meals & dishes, food products N.E.C.

Source: Estimated from MoFPI, Database- website

Though capital intensity in the FPI segments is least compared to other industrial sectors, it has a bearing on the ways in which the farming community, producers of the key inputs, stands to gain from the respective processing segments. Fruits and vegetables, grains (cereals and pulses), sugarcane, and milk are the key inputs in the four segments we explore here. The four segments together account for 67.5 percent of all fixed capital invested in the FPI in India.

At Rs. 82.60 lakh per unit, the grain and milling segment (without starch products) is the least capital intensive among all the segments of the FPI. The grain milling and starch products segment which has always been one of first avenues of non-farm investments made by the farming community in India (in the green revolution period – starting during the mid-1970s and taking off by the 1980s), has witnessed a marginal increase in fixed capital investment per processing unit over the period 2007-8 to 2011-12 (Table 5). With the starch and starch products added, the segment shows a substantial increase in capital investment per unit, from Rs. 55.7 lakh (2007-08) to Rs. 92.3 lakh (2011-12).

The primary and even secondary processing avenues open to farming communities, by way of fruit and vegetable processing or dairy products, are far more capital intensive than the grain and milling segment (as much as over 4 to 6 times). With increasing investments in cold chains and chilling plants, equipments, packaging material and transport, the dairy segment has had the maximum increase in capital investment per plant during the period 2007-08 to 2011-12. Yet, it accounts for only 7.3 percent of the total fixed capital investment in the FPI. This, when compared to the 44.5 percent share that bakery and confectionary segment accounts for, is miniscule.

The bakery and confectionary segment is the most capital intensive at Rs. 764.4 lakh per unit (for all the sub-groups in the segment, including the sugar industry). Capital intensity of production in the bakery and confectionary segment also reveals the predominance of tertiary processing in the factory sector FPI catering directly to the middle class urban markets (the share of these items in India's processed food exports is still minimal). It uses inputs from other segments of the FPI, especially grain milling and starch (as malts, semi processed and processed starches or extracts), dairy (creams, butter, milk – in various grades of fat), fruit and vegetable products (cleaned and graded material to preserves, jams, jellies, and other extracts). This is one of the key reasons why outsourced manufacturing jobs account for 30-40 percent of the total costs in this segment; massive in the light of the sheer size of the segment (see Table 3) and when compared to other FPI segments where outsourced manufacturing accounts for a maximum of 7-

12 percent in the dairy products segment and 0.11 percent in the starch sub-segment (CMIE, 2013). In some cases like fruit based confectionary items this outsourced manufacturing is essential for the sheer cost saving in transport. There is also limited availability of bulk packaging technologies for semi-processed items that can be shipped to the central factory floor (in some other state from the site of fruit production and primary processing). This massive segment – bakery and confectionary, creates more investment and income opportunities for the middle class. While this *Bulletin* will not discuss any of the established dietary imbalances caused by tertiary processing and its inputs (the best example being obesity and corn starch sweeteners), in our policy analysis it is important to point out that in the current model of massive factory production, few of the bakery and confectionary products add nutritive value or provide employment and incomes to the rural poor. Moreover, the rural and farm workers have little skill or knowhow of equipments to work with in the rapidly growing and highly capital intensive tertiary processing segment of bakery and confectionary.

This section shows how capital intensive policy instruments and the demand for unskilled and semi-skilled workforce seem to be drivers of creating employment opportunities in FPI for rural and farm workers. While the policy framework for FPI may provide a few more jobs in the formal factory sector, it will alienate a massive number and wide range of agri-horticultural and livestock produce, processed foods consumed by millions in the country, and processing technologies and skills, from opportunities for value-addition and scope for better rural employment and incomes.

5. Policy Lessons and Options

The current FPI policy goals of adding employment and incomes in farm households, strengthening the rural economy and increasing value-addition within the country, appear impossible, given the MoFPI's choice of policy instruments. The FPI itself is shrinking within India's industrial GDP, which has also achieved limited and jobless growth rates over the past decade. The aggregate demand constraint, especially in rural India continues, as legal and policy attention in FPI is entirely on centralized programmes, regulations and standardization of the diverse and mainly informal and unorganized food processing sector. Adding to this, the increasing capital investments (especially FDI) in energy intensive production for middle class and export markets, widens and reinforces the relative distancing of FPI from agriculture and allied sectors. Despite being the major suppliers of raw material for FPI, marginal and small farmers are rarely been part of the organized contract farming that medium and large farms are in. They are increasingly being forced to remain contract farmers (Singh, 2012) with no formal contract (or buy-back arrangement) or guarantee, and no market to fall back upon, given that the APMC has been rendered an entity that India's FPI shuns.

In this context, ***the organized FPI should ideally enable an alternative knowledge-policy paradigm, where strong inter-disciplinary research on agrarian and industrial realities, involving detailed deliberations with stakeholders, will shape appropriate policy instruments.*** The MoFPI, needs to ***identify and enable agro-ecologically and regionally appropriate processing protocols, skills and business models, and ensure public investment in them.*** Unlike the formal factory sector pleading for tax breaks, sops and subsidies, the unorganized processing actors need only a little support in terms of public investments and services. It is unlikely that one MoFPI at the Union Government level can accomplish this, and unleash the growth of the massive and highly diverse food processing economy in India. Appropriate institutional arrangements are needed at different levels of public administration and agro-ecological

production-processing systems. ***Several State Governments, co-operatives, quasi-public and private enterprises will have to join hands***.

Some recent trends offer hope. There is a major change within and between the States in their FPI policies and investments. Taking the fruit and vegetable processing segment as a case, it is evident that in 2008-09, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu, together accounted for the total national gross value added (GVA) in the segment. But by 2011-12, many other State Governments and private industry had invested in the segment (bringing Punjab into the top four states) and a more regionally dispersed segment. In 2011-12, the four leading states together, account for only half the GVA in the segment. Much of the investment in fruit and vegetable processing and in SMEs, and many of them located in the vicinity of the hinterlands that constitute the supply base of the raw material. It is this segment that offers policy options for different business models, rapid expansion of FPI, minimum wastage of raw produce, and maximum rural employment and incomes.

The evidence for this diversity in food processing, marketing and consumption comes from all parts of India; the famous Lijjat papads (a women's cooperative), the Vanastree Seed Savers (a collective trust), the Bhuira jams and jellies (a cottage industry), the Farmers brand juices and preserves (a small enterprise by farmers) are a mere glimpse of the massive number of local food processors, with viable business models, and a creative balance between capital intensity and labour or skill use in every unit of the produce. Bhuira, for instance, as an agri-business that is owned and operated by women, structured as a cottage industry using (almost entirely) manual labour, churning out nearly 100 tonne of jams and jellies per year, and maintaining its social and ecological values, is news in Himachal Pradesh, a State that processes over 15 percent of the fruits produced in the State (compared to the 2 percent at the all India level).

Bhuira's business design is one that integrates inputs and services from a range of local sources and markets. But the non-linear innovation system that Bhuira as an enterprise has created, the seasonally variable flexible specialization that characterizes the Bhuira factory and workforce, and the market network (from supermarket shelves to online orders and local corner stores) are alien to the capital intensive subsidy-and tax-incentive driven factory sector that the MoFPI promotes. Most crucially, the consumer loyalty that approves the chemical free quality and freshness of the produce, and the variation in tastes (especially between two jars of chutneys made of the same fruit in two different years or seasons), year after year, is not enforced by a uniform regulation. Not only are alternative business models difficult to conceptualise in linear policy language, but they are also difficult to operationalise as policy instruments. For instance, how would a policy instrument like a fuel subsidy work for Bhuira, Gopala and Keystone Foundation?

Some thoughtless policy interventions like delisting vegetables and fruits from the Agricultural Produce and Marketing Committee (APMC) in 2014 (say, in Bihar), were perhaps well intentioned. But they had no understanding of local supply chains, intermediate trade networks, and price fluctuations, and ended up adding post-harvest handling and marketing costs to the already burdened farmers, who had neither the skills nor the backing of public investments and support systems for storage, processing or marketing.

The MoFPI should step out of the subsidy syndrome and enable:

a. ***public investments in infrastructure,*** with regular maintenance and service support,

b. local ***skill enhancement, building on traditional processed foods, women's knowledge*** and the energy efficient and nutritive value enhancing protocols ***specific to each local agri-food system.***

c. equipments and protocols that can ***maximize the flexible specialization*** necessary to accommodate the seasonal and intra-regional variation and diversity of raw produce,

d. collective or ***local government owned processing facilities*** (like the erstwhile "canning centres"),

e. stringent ***principles and practices of market promotion and quality control*** in each region, and

f. ***business designs that will maximize the location-specific value-addition, jobs and incomes***,

g. participation and ***pro-active engagement of the increasingly health conscious middle class consumer in short value-chain or local value-networks*** of processed food products and markets.

Knowledge and policy in other associated industries will have to change too. FPI must be visualized as a bridge sector, and not as a mere manufacturing sector. It needs to connect, use inputs and services from, and cater to several primary, secondary and tertiary sector actors. For instance, a jar of fruit preserve brings together human resources, horticulture sector (fruits), chemical industry (ranging from salt to citric acid to colours), packaging industry (glass, metal, labeling), infrastructure and support investments (warehouses, cold storage) and services (transport, quality control and food safety, advertising and retail). New knowledge or technological and institutional innovations in any of these forward or backward linkages or sub-sectors involved adds value to FPI.

Last and most important, ***there is a dire need for scientific research on these technological and institutional innovations***. Whether they are new instruments to attract FDI, new fruit preservation techniques, financial incentives or tax breaks for industry, canning and bottling equipment, or optimal milk collection routes, the policy instruments today seem to emerge with some expected outcome (based on FPI sector design and performance in other countries). There is little research done to generate the evidence and enable an alternative knowledge-policy paradigm for a FPI that can add value and employment and incomes to millions of rural households, and ensure its own expansion in the process. ***A willing MoFPI can successfully lead India's knowledge-based industrialization and rural transformation strategy***.

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