Feeding a Billion People: The Role of the Food Processing Industry

As India’s population soars past one billion, the challenge of feeding its people also grows. The food processing industry is positioned to be a vital part of the solution.
Foreword

The food processing industry—with an output of $180 billion, employing more than 3.1 million people in organized and micro, small, and medium enterprises (MSME) processing, and playing a crucial role in local economies—is an important contributor to India's economic and social growth. As the first organized stage of the value chain, food processing provides a vital link between agriculture and food consumption. Accordingly, it has a central role to play in driving productivity improvements across the value chain and increasing the availability of affordable, nutritious, and safe food.

The role of the food processing industry is crucial, considering the immense and immediate challenge of providing nutritious food for more than a billion people. Over the past decade, India's unsatisfactory progress in improving health and nutrition has been in stark contrast to unprecedented levels of GDP growth and poverty reduction. For example, the National Family Health Survey showed that, at the current rate of progress, India will not reach its millennium development goal—to halve the proportion of underweight children by 2015—until 2043.

Within this context, Feeding a Billion: The Role of the Food Processing Industry, a joint paper by FICCI and A.T. Kearney, provides a perspective on the role and impact of food processing in providing high-quality, safe foods for end consumption while also being a growth catalyst in our economy by generating employment, providing a boost to the agriculture industry, and attracting capital. This paper also discusses major food segments where focus is needed to address the country's calorie and nutrition needs over the next 10 to 15 years, prioritizes key challenges, and proposes the best way forward for key stakeholders.

Several insights stem from discussions with industry leaders across various Indian companies in the food processing business. We gratefully acknowledge their valuable input as well as the data sources, including industry reports and publications, databases, and company websites used for this paper.

We appreciate the efforts of the A.T. Kearney team that led the development of this report: Debashish Mukherjee, Himanshu Bajaj, Namit Garg, and Joshua Abraham. And we are grateful to Mr. Siraj Hussain, secretary of the Ministry of Food Processing Industries, for his valuable guidance. We are also grateful to the following people for their valuable input during the development of this report: Mr. Arnab Hazra (director, Confederation of Indian Food Trade and Industry), Mr. Chris Buckthorp (chief supply chain officer, Gati), Mr. K. Radhakrishnan (president, Future Freshfoods), Ms. Rachna Chhachhi (director and chief strategy officer, ChiHealth), Mr. R.S. Sodhi (managing director, Amul), Mr. Sanjay Khajuria (senior vice president, Nestlé), Mr. Siva Nagarajan (managing director, Mother Dairy), Dr. S.K. Ranjhan (director, Hind Agro Industries), and Mr. Varun Berry (chief operating officer, Britannia).

Siraj Chaudhry, chairperson of FICCI Food Processing Committee and chairman of Cargill India

Sangeeta Pendurkar, co-chairperson of FICCI Food Processing Committee and managing director of Kellogg India
Linking Food Producers with Consumers

The food processing industry is playing a central role in linking producers with consumers and therefore has an important impact on farming and distribution. It is a major source of employment and income for rural areas and holds the key to reducing waste in the perishables supply chain. As demand for nutritious fruits and vegetables increases every year, modernizing the supply chain will prove a boon for producers and consumers.

To further highlight the potential role of this sector in the economy, this report, Feeding a Billion People: The Role of the Food Processing Industry, is being released to identify challenges and provide the way forward for concerned stakeholders. We expect this report to help further the sector’s growth.

Siraj Hussain
Secretary, Ministry of Food Processing Industries

India’s Food Processing Industry Needs To Be “Agriculture Plus”

The food processing industry in India has been hailed as one of the sunrise sectors for 25 years now. Although its potential has never been in doubt, its importance as a growth driver has just recently been realized.

Estimated to be around $180 billion (INR 8 lakh crore), the food processing industry contributes about 1.3 to 1.5 percent to India’s GDP. And given India’s billion-plus population, the industry has a wider role to play in the coming years. Besides its core role of increasing the shelf life of food, preserving food nutrients in the supply chain, and providing fortified products targeted at micronutrient deficiencies, the industry needs to provide several more benefits to other areas in the value chain: providing farm extension services, improving price realization for farmers by reducing the number of intermediaries, and strengthening the supply chain. In other words, the food processing industry needs to be “agriculture plus.”

This year’s theme for Food World India, held in Mumbai in September, was “Feeding a Billion.” In accordance with the theme, this report looks at the gaps that exist in production, food security, nutritional deficiency, quality, safety, and consumer awareness. With immense supply strength in agriculture, the food processing industry is expected to play a central role across the food value chain in addressing these areas.

The country now needs to take a fresh look at the existing initiatives led by government and private players to enhance their effectiveness and remove the impediments to implementation.

I am confident that this joint effort by FICCI and A.T. Kearney will be instrumental in highlighting the agri-food sector’s potential.

A. Didar Singh
Secretary General, FICCI
Making the Case for Immediate Action

Over the past decade, India has made phenomenal progress in terms of GDP growth and, along with it, growth in several indices that measure overall progress in areas such as income, aspirations, consumption patterns, and lifestyles. Much has already been said, and rightly so, about the strength of our consumption-driven growth, fueled by strong growth in the services sector. However, we are now at a point where the “bowl” that has been feeding the hearts and minds of the billion-plus population driving that growth urgently needs to be replenished. Hence, the topic of this paper—“Feeding a Billion”—couldn’t have been more opportune.

“There are people in the world so hungry that God cannot appear to them except in the form of bread.”

—Mahatma Gandhi

Food as a sector has several available commentaries on this subject. However, we have strived to add value in the following ways:

- The food processing sector needs to be central to the transformation of the food value chain because it is the first organized link between the farm and the shelf: Several creative means are available, including government and policy bodies, to work through a win-win partnership model with industry.

- Take a **holistic view of food** beyond packaged foods and calories (hunger): This report covers the challenges and solutions for the whole food industry from farm to fork and from a balanced nutrition perspective—not just the macro availability of calories.

- Bringing to bear a **holistic framework for market creation** in food, which all stakeholders can use to calibrate their imperatives and a prioritized set of action points

- Uniquely bringing together primary and empirical research in multiple food value chains to establish a robust, fact-based case for action

We hope the case for immediate action will come across clearly, thereby driving greater urgency and clarity in policy and its implementation. This report is the first in a series of initiatives that need to be debated, perhaps in even more detail, to provide further impetus and recognition of these challenges and solutions.

**Debashish Mukherjee**
Partner, A.T. Kearney, Inc.
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Executive Summary

Economic growth over the past decade has led to significant poverty reduction, raising nearly 20 million people above the poverty line every year. However, India continues to face significant bottlenecks in feeding nutritious food to more than a billion people, leading to issues around chronic undernourishment and malnutrition, lifestyle diseases, and micronutrient deficiencies. Resolving these issues will require improvements on several fronts: availability, affordability, consumer awareness, quality, safety, and access to food. Therefore, what’s needed is an approach that reaches across the value chain. We believe the food processing industry will need to play a central role in driving improvements in the country’s nutrition situation because it is the first organized link between the farm and the shelf. The Indian market’s unique conditions, such as consumer preference for fresh foods, high local availability of food, and a low degree of value-chain organization also implies a broader role for the food processing sector beyond just packaged food. Finally, it is important to note that food processing is a significant contributor to economic and social growth—with high outputs ($180 billion in 2011), substantial employment generation (more than 3.1 million employees in organized and MSME segments), and an impact on local economies. Therefore, the food processing sector deserves the attention of all key stakeholders in the government and private enterprises.

To feed the country’s currently undernourished population, India would need a 3 to 4 percent increase in its food supply. By 2025, two factors will impact the country’s food requirement, driven primarily by increasing incomes, rapid urbanization, and more inclusive growth:

- India’s food mix will continue to move away from grains and pulses and toward dairy, fruits and vegetables, meat, and edible oils
- Aggregate energy intake levels are likely to increase

There are significant risks to availability that need to be bridged by the food industry, especially for grains and pulses, edible oils, and dairy products:

- The grains and pulses segment will need to replicate production growth achieved from 2001 to 2011 until 2025 in order to reach the necessary supply levels—doing so despite the meager increase in land under production coupled with plateauing yield growth. An inability to affect quantum improvements in yields could result in a shortfall of as much as 11 million tons of food grains by 2025.
- Rising incomes will drive up consumption of edible oils, which is expected to substantially increase in the share of energy intake. Although India is one of the world’s largest producers of oilseeds, it imports around 55 to 60 percent of its domestic edible oil consumption requirements. This poses a major challenge because high import dependence means an uncertainty in supply and the potential for significant variability in prices.
- Although the dairy segment has been one of India’s success stories, sustaining production growth will require significant investments to ensure the sector meets demand requirements by 2025. In addition, substantial gaps in availability of livestock feed supply and competition for acreage from food crops pose fundamental threats to necessary dairy production.
- The fruits and vegetables and meat and poultry segments have seen rapid growth over the past two decades, but this is expected to stagnate as competition for usable land increases. In addition, the threat of more lucrative export markets could divert the food supply away from domestic food availability, or more significantly, shift land away from segments such as food grains, edible oils, and dairy products, which run the risk of shortage by 2025.
In addition to availability, the pillars supporting improvement in India’s nutrition future are affordability, quality and safety, and consumer awareness. Issues in each of these areas have been contributing to the nutritional challenges India faces. Availability and affordability limitations for lower-income groups have led to persistent undernourishment. Lack of awareness and issues with food quality have driven overconsumption in upper-income groups, and all four contribute to the high incidence of micronutrient deficiencies. Securing India’s nutrition future requires addressing the underlying structural causes of these gaps and limitations, including:

- Slowdown in productivity and lack of alignment on production incentives that impact farm output
- Limited organized presence and poor infrastructure in procurement and the supply chain that lead to waste, unnecessary price buildup, and poor food quality and safety
- Lack of scale and modern technology that limit the nutritional impact and value-add in the processing stage
- Inability to effectively monitor and ensure food quality and safety across the value chain
- Gaps in research and training that limit improvement programs across the value chain
- Absence of consumer awareness about balanced diet, quality, and food safety issues

Eleven initiatives for India’s food and nutrition situation can effectively meet the goal of feeding a billion people (see figure 1). Across these 11 areas, four broad themes, discussed in detail in this report, form the basis of an action agenda for private players and government:

![Figure 1: Initiatives for feeding a billion people in India](image)
1. Leverage private-public partnerships in the areas of production, extension services, supply chain, and high-nutrition foods

2. Simplify regulations and policies, and ensure stronger implementation in areas of integrated planning, implementation, and standardization

3. Improve transparency in price, volumes, and inventory of food produce

4. Increase innovation and skills to drive growth over the next decade

A New Introduction to Food Processing in India

This paper brings fresh perspectives to the challenge of feeding more than a billion people. Although one can argue that the onus of such a big task should be spread across the traditionally understood areas of agriculture and food processing and then the downstream services of storage, logistics, and retail, it is clear even today as India evolves in this space, that the leadership for achieving this goal must come from the food processing sector.

To this end, we must first move beyond the traditional understanding (perhaps even bias) of considering food processing as the packaged foods sector, which thrives on a pure buying-and-selling transactional relationship across the food value chain. In fact, it is quite the opposite. As scale increases, food processors must invest heavily in productivity improvements in the back-end value chain (such as farming) and encourage improved, safer consumption choices for customers. In short, food processing is the vital link between the agriculture sector and final food consumption by citizens. With this in mind, we are careful to highlight the challenges and opportunities across the value chain in a balanced manner, to be discussed and solved in the context of “Feeding a Billion.”

Scope and role

India’s food value chain is different from more established markets because of the presence of both organized and unorganized players and the country’s unique consumption pattern (see figure 2). Consumption at the retail level consists largely of non-processed products or food with very limited processing in key categories such as fruits and vegetables, meat and poultry, dairy, grains, and pulses.

Figure 2
Indian consumers tend to avoid processed produce and dairy products

<table>
<thead>
<tr>
<th>Share of processing in fruits and vegetables</th>
<th>Share of processing in milk and dairy products</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>India</td>
</tr>
<tr>
<td>2%</td>
<td>35%</td>
</tr>
<tr>
<td>Brazil</td>
<td>Australia</td>
</tr>
<tr>
<td>30%</td>
<td>More than 80%</td>
</tr>
<tr>
<td>Malaysia</td>
<td></td>
</tr>
<tr>
<td>82%</td>
<td></td>
</tr>
</tbody>
</table>

Sources: NIIR Project Consultancy Services, Dairy Australia, A.T. Kearney analysis
The difference in the Indian market is driven by demand and supply factors:

- **Consumption behavior.** Indian consumers prefer to procure unprocessed and fresh food and then convert it into a consumable form through the food preparation process either in homes or restaurants. This is distinct from many other countries where consumers prefer to purchase more ready-to-eat foods. However, consumption behaviors are changing in urban centers as the younger generation shifts toward processed foods because of a lack of time.

- **Wide availability.** Most food products such as fruits, vegetables, and milk are widely available across the country, which is unique to India. Therefore, there is not much need to package and preserve food for transportation over long distances.

- **Limited evolution of the food processing sector.** In areas such as core processing, warehousing, logistics, and production, India’s food value chain is still nascent, with more limited use of modern technology and labor-intensive processes than countries such as the United States, which are characterized by large-scale contract farming, extensive cold chains, and advanced warehousing capabilities.

These differences create challenges, including large amounts of waste, limited opportunities for food fortification through nutrients, and quality and safety risks. Thus, India’s food processing industry has a much wider role, which can be split into three activities (see figure 3):

Figure 3
**India’s food processing industry has three segments**

<table>
<thead>
<tr>
<th>Primary processing</th>
<th>Secondary processing</th>
<th>Tertiary processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits and vegetables</td>
<td>Cleaning, cutting, and sorting</td>
<td>Pulps, pastes, and slices</td>
</tr>
<tr>
<td>Grains and cereals</td>
<td>Sorting and grading</td>
<td>Flour, malt, and milling</td>
</tr>
<tr>
<td>Dairy products</td>
<td>Grading and refrigeration</td>
<td>Cottage cheese, cream, and dried milk</td>
</tr>
<tr>
<td>Meat and poultry</td>
<td>Sorting and refrigeration</td>
<td>Cut, fried, and frozen</td>
</tr>
<tr>
<td>Marine products</td>
<td>Chilling and freezing</td>
<td>Cut, fried, and frozen</td>
</tr>
<tr>
<td>Edible oils</td>
<td>Sorting and grading</td>
<td>Refined oils</td>
</tr>
</tbody>
</table>

Source: A.T. Kearney analysis

- **Primary processing:** cutting, cleaning, and refrigeration
- **Secondary processing:** grain milling, manufactured fruit pulps, frozen meat and poultry, and packaged milk
- **Tertiary processing:** manufacturing fruit jams and juices, biscuits, milk products, ready-to-eat meals, protein supplements, and confectionery

These activities help preserve food nutrients, increase shelf life, improve nutrition levels through fortification, and give consumers more choices. In addition and equally important, the food processing sector can impact other areas of the value chain through its forward and backward linkages:
- **Farming and other food production.** Increasingly, food processing companies are strengthening their backward integration through initiatives such as agriculture extension services. This will drive up productivity in the farming sector and improve quality and safety. With higher visibility of demand, food processing companies can also help improve the crop mix in agriculture, leading to better availability and affordability of food products.

- **Procurement.** Food processing companies can deploy more scientific methods for sorting and grading of produce. Higher involvement in procurement will also help improve price realization for farmers by reducing intermediaries and thus lowering price buildup by eliminating non-value-adding activities.

- **Supply chain.** The increasing role of the food processing industry can help accelerate investment in storage and transport capabilities, thereby lowering wastage levels, improving nutrient retention during storage and transportation, and enhancing the shelf life of products.

### Impact on the economy and size of the industry

In 2011, the size of India’s food processing sector was around $180 billion, including both the organized and unorganized sectors, with organized forming 50 to 55 percent of the overall market. Grains and pulses, beverages, and other foods and dairy products make up around 80 percent of the total processed food market (see figure 4). The sector is expected to grow at around 13 percent on a nominal basis and reach $530 billion to $550 billion by 2020. Within the food processing sector, segments such as meat and marine, edible oils, and grains and cereals are expected to grow significantly.

#### Figure 4

**India’s processed food market**

(% share, 2011)

- Grains and pulses: 34%
- Meat and marine: 9%
- Dairy: 15%
- Fruits and vegetables: 2%
- Oil: 8%
- Beverages and others: 32%

Sources: Ministry of Food Processing Industry’s annual report for 2012-13; analyst reports; census of micro, small, and medium enterprises; A.T. Kearney analysis

The sector has a substantial impact on the economy because of the scale of output generation, employment creation, and the impact on rural economies, which rely heavily on agriculture and associated manufacturing and services for income.

- **Scale of outputs.** At $180 billion, the food processing industry is significantly larger than many other labor-intensive sectors, including textile ($79 billion), apparel ($27 billion), and...
leather ($11 billion). In addition, the distributed nature of unorganized food processing across the country leads to wider employment across rural and urban regions.

- **Potential to generate employment.** The food processing industry has significant potential to generate employment (3.1 million people) compared to textiles (2.5 million), apparel (1.8 million) and leather (0.5 million). The industry directly employs more than 16 lakh workers in factories along with more than 14 lakh workers in the MSME segment. In addition, it has the potential to impact more than 1.2 crore people across its suppliers and supply chain.1

- **Impact on the local economy.** Because a large share of the industry is based in rural, semi-urban regions, there is a significant multiplier effect on local economies as these regions provide both raw materials and labor. This boosts the local economy by generating income, which has a cascading effect on the economy. The food processing industry typically has an output multiplier of two to four on GDP. The output multiplier for a sector defines the additional outputs in an economy generated as a result of the cascading effect of outputs of the primary sector. For example, a $1 billion growth in the food processing sector could translate into additional GDP growth of $2 billion to $4 billion in adjacent sectors in the food value chain as well as the larger ecosystem. Case studies in India reveal the significant impact food processing has on local ecosystems (see figure 5).

![Figure 5](image)

**Food processing improves local ecosystems**

**Example**

<table>
<thead>
<tr>
<th>Growth of one factory supplier base</th>
<th>Direct impact</th>
<th>Indirect impact</th>
</tr>
</thead>
</table>
| **2011** | 86,400 | • 2,400 factory jobs  
• 86,400 farmers employed; 45 to 65 percent employment generated by suppliers  
• Payment of INR 6,120 million to local milk producers |
| **1983** | 45,000 | • Improved dairy productivity thanks to farm agriculture extension services  
• Farmers invest in farm technology and animal husbandry  
• Water and basic facilities for local schools, benefitting more than 40,800 students |
| **1961** | 180 | |

Sources: Third World Centre for Water Management (Mexico), Nestlé; A.T. Kearney analysis

In addition, the food processing industry, through its backward and forward linkages, has tremendous potential to influence other parts of the food value chain. This can lead to reduced waste and improved farm productivity through investments in the supply chain and farm extension services for agriculture.

- **Role in waste reduction.** Food waste is a significant issue, especially in perishable segments such as fruits and vegetables. Losses in perishables can result from mechanical damage, microbiological agents, or aging of products. These losses can become significant with

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1 Based on employment multipliers as per the Government of India’s Press Information Bureau.
improper handling during storage and transportation and unsuitable environmental conditions such as high humidity. Inadequate cold storage facilities and a lack of a modern warehouse infrastructure, along with a high number of intermediaries in India, lead to high nutrient loss in fruits and vegetables. It is estimated that around 7 to 8 percent of loss occurs in fruits and vegetables in India after harvesting. However, this does not account for the loss of nutrients in fruits and vegetables that leads to lower economic value realization of produce. The food processing industry can play an important role in building the required infrastructure as well as introducing best practices for storage and handling.

Role in enhancing farm productivity. Many farmers in India face the problems of traditional technology and practices, limited bargaining power with input suppliers, inadequate infrastructure, a lack of market information, and limited access to capital. The food processing sector can play a vital role in enhancing productivity in categories such as milk and fruits and vegetables by providing farm extension services to their suppliers or through contract farming. For example, in dairy, contract farming led to a 42 percent increase in the number of milking animals and a 55 percent increase in total milk production.

Feeding a Billion People: A Holistic Framework

The past decade has seen the Indian economy grow at unprecedented rates. This has led to record-breaking poverty reduction, with nearly 20 million people climbing above the poverty line every year for the past decade. However, India continues to face a significant challenge in its goal of feeding its population and keeping it healthy. Despite being one of the fastest-growing global economies, India continues to score poorly on various health and nutrition indicators (see sidebar: UNICEF: Millennium Goals for Eradicating Hunger).

India’s nutrition challenges span three fronts. First, a large portion of the lower-income classes is undernourished. In addition, those in the more well-off income classes are suffering from more lifestyle diseases, such as diabetes, hypertension, and coronary heart disease. Lastly, India has a high incidence of diseases caused by micronutrient deficiencies, including anemia, goiter, and night blindness.

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2 China has reduced the prevalence of underweight children younger than five years old from 15 percent in 1992 to 3.5 percent in 2009. Brazil has achieved reductions from 4.5 percent in 1996 to 2.2 percent in 2007.

3 Central Institute of Post-Harvest Engineering and Technology study.

4 “Review on contract dairy farming to boost Indian dairying,” Indian Veterinary Research Institute
• **Chronic undernourishment and malnutrition.** India has among the highest shares of underweight children among lower middle income countries (see figure 6). With around 44 percent of children younger than five underweight, India performs worse than all lower middle income countries and on par with low income countries in sub-Saharan Africa. At an overall level, the share of the total population suffering from undernourishment (defined as consistent and chronic undernutrition) is also high, with only Pakistan, Sri Lanka, and some sub-Saharan countries worse off than India. It is no surprise that India ranks 106th out of 120 countries in the 2012 Global Hunger Index—and this represents a drop from 90th out of 117 countries in 1996. Undernourishment and malnutrition, especially in children, are problems that need to be addressed immediately, as the true economic costs only become apparent when children reach working age. For example, malnourished children may earn up to 20 percent less than healthy children in adulthood, resulting in a global economic cost of $125 billion in 2030, when they have reached working age.5

**Figure 6**  
**Many children in India are underweight**

<table>
<thead>
<tr>
<th>% of underweight children under age 5</th>
<th>% of undernourishment in total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>Sri Lanka</td>
</tr>
<tr>
<td>7%</td>
<td>4%</td>
</tr>
</tbody>
</table>

GDP per capita as of 2012 (current $ purchasing power parity)

<table>
<thead>
<tr>
<th>GDP per capita</th>
<th>Egypt</th>
<th>Sri Lanka</th>
<th>Indonesia</th>
<th>Philippines</th>
<th>India</th>
<th>Vietnam</th>
<th>Ghana</th>
<th>Pakistan</th>
<th>Sudan</th>
<th>Nigeria</th>
<th>Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,420</td>
<td>5,930</td>
<td>4,900</td>
<td>4,100</td>
<td>3,910</td>
<td>3,590</td>
<td>3,200</td>
<td>2,860</td>
<td>2,670</td>
<td>1,920</td>
<td>1,710</td>
<td></td>
</tr>
</tbody>
</table>

Decreasing GDP per capita

Sources: Dupont Food Security Index 2012, United Nations and World Bank data; A.T. Kearney analysis

• **Lifestyle diseases.** Economic growth is a double-edged sword. While a 10 percent increase in GDP per capita is correlated with a 5 to 6 percent reduction in child stunting, it is also associated with a 6 to 7 percent rise in obesity (see figures 7 and 8 on page 10). The situation in India is approaching critical levels. Lifestyle diseases, including cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases, are expected to cost the economy $6 trillion in output losses between 2012 and 2030.6 This figure is nearly nine times India’s total health expenditure of $710 billion from 1993 to 2011. While these diseases are typically associated with the higher income classes and the urban demographic, India is seeing increasing penetration in rural areas as well with a rapid increase in fats and oils in the diet.

• **Micronutrient deficiencies.** The lack of regular intake of micronutrients such as iron, vitamins, calcium, and iodine can be seen in the high incidence of deficiency diseases in India. About 50 to 70 percent of women and children have iron-deficiency anemia, and

5 Save the Children analysis, 2013
6 Harvard School of Public Health, 2013; World Health Organization, 2011
around 30 to 35 percent of men are estimated to be iron deficient. Iodine deficiency disorders such as goiter affect 5 percent of the population, with only around 50 percent of families consistently taking requisite iodine by using iodized salt. India’s cereal- and pulse-focused diet is naturally deficient in some of these micronutrients, especially iron, vitamin A, and calcium, because of the low intake of vegetables, fruits, and animal products. The high

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7 Micronutrient Security for India, Indian National Science Academy, 2011; Dietary Guidelines for Indians, National Institute of Nutrition, 2010
8 The 2005–06 National Family Health Survey (NFHS-3)
income elasticity of pulses further reduces micronutrient intake for lower-income families. Productivity losses from an inadequate micronutrient intake are estimated to be as high as 10 percent of lifetime earnings, which would severely impact GDP if left unchecked.

The challenge of providing access to balanced nutrition to the Indian population has five broad dimensions (see figure 9). The food industry will need to pursue major improvements across all of these areas to address India’s nutrition problem.

Figure 9
Framework for improving access to nutritional food

Availability
- Sufficient, low volatility food supply per capita
- Strong and dependable agriculture sector

Quality and safety
- Diversified diets
- Micronutrient availability
- National nutritional standards
- Food safety regulations

Access
- Strong distribution system and infrastructure
- Sufficient carrying capacity

Affordability
- Population with purchasing power
- Food supply aligned with demand
- Farmers have access to financing

Awareness
- Knowledge of balanced diet and nutritional gaps
- Understanding of food safety and quality

Nutrition outcomes

Availability
Food availability is basic to nutritional well-being, and sufficient availability of quality foods that provide the energy, proteins, and fats needed for full and balanced nutrition is fundamental to a well-nourished population. Improved availability can help address India’s energy and micronutrient deficit.

Feeding India’s currently undernourished population would require a 3 to 4 percent increase in the food supply. However, the substantial disparity in incomes and consumption limits the real availability of any incremental food supply to the undernourished. Clearly, wealthier income classes have a far higher food intake than middle and lower income classes. In addition to income disparity, interstate and urban-rural disparities also limit real food availability and contribute to a lack of nutrition for specific pockets of people. Consumption disparity drives India’s low level of aggregate calorie consumption. With average consumption of around 2,140 kilocalories per day, India’s population is roughly 10 percent lower than the median level of the basket of lower middle income countries and around 20 percent lower than the median level for upper middle income countries including Brazil and China.

By 2025, two factors will impact the country’s food requirement, driven primarily by rising incomes, rapid urbanization, and more inclusive growth.
• India’s food mix will continue to move away from grains and pulses and toward dairy, fruits and vegetables, meat, and edible oils (see figure 10).

• Aggregate energy intake levels are likely to increase.

Figure 10
India’s food requirements are expected to shift

We believe the food industry needs to bridge several significant risks to availability for grains and pulses, edible oils, and dairy products.

• Despite the decrease in the share of energy intake, the grains and pulses segment will essentially need to replicate production growth achieved from 2001–2011 until 2025 to reach the necessary supply levels. However, a meager increase in land under production coupled with plateauing yield growth will be major challenges (see sidebar: Radical Farm Reform Needed to Continue Self-Sufficiency Paradigm on page 13). An inability to affect quantum improvements in yields could see a shortfall of as much as 11 million tons of food grains by 2025.

• Rising incomes will drive up the consumption of edible oil, which is expected to substantially increase in the share of energy intake (see figure 11 on page 14). Although India is one of the world’s largest producers of oilseeds, it imports around 55 to 60 percent of its domestic edible oil consumption requirements. This poses a major challenge because high import dependence means an uncertainty in supply and potential for significant variability in prices. While the dairy segment has been one of India’s success stories, sustaining production growth will require significant investments to ensure the sector meets demand requirements by 2025.

Sources: Food and Agriculture Organization Food Balance 2009, National Sample Survey Office 66th round 2009-10; A.T. Kearney analysis

A 20 percent increase in per-capita energy levels is based on similar experience in developing countries during high growth periods.

Share of daily energy consumption (% of kilocalories)

Domestic supply and demand (million tons)

1

We believe the food industry needs to bridge several significant risks to availability for grains and pulses, edible oils, and dairy products.

• Despite the decrease in the share of energy intake, the grains and pulses segment will essentially need to replicate production growth achieved from 2001–2011 until 2025 to reach the necessary supply levels. However, a meager increase in land under production coupled with plateauing yield growth will be major challenges (see sidebar: Radical Farm Reform Needed to Continue Self-Sufficiency Paradigm on page 13). An inability to affect quantum improvements in yields could see a shortfall of as much as 11 million tons of food grains by 2025.

• Rising incomes will drive up the consumption of edible oil, which is expected to substantially increase in the share of energy intake (see figure 11 on page 14). Although India is one of the world’s largest producers of oilseeds, it imports around 55 to 60 percent of its domestic edible oil consumption requirements. This poses a major challenge because high import dependence means an uncertainty in supply and potential for significant variability in prices. While the dairy segment has been one of India’s success stories, sustaining production growth will require significant investments to ensure the sector meets demand requirements by 2025.

Sources: Food and Agriculture Organization Food Balance 2009, National Sample Survey Office 66th round 2009-10; A.T. Kearney analysis

A 20 percent increase in per-capita energy levels is based on similar experience in developing countries during high growth periods.

Share of daily energy consumption (% of kilocalories)

Domestic supply and demand (million tons)

1 A 20 percent increase in per-capita energy levels is based on similar experience in developing countries during high growth periods.

Sources: Food and Agriculture Organization Food Balance 2009, National Sample Survey Office 66th round 2009-10; A.T. Kearney analysis

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Domestic supply and demand (million tons)

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Sources: Food and Agriculture Organization Food Balance 2009, National Sample Survey Office 66th round 2009-10; A.T. Kearney analysis

A 20 percent increase in per-capita energy levels is based on similar experience in developing countries during high growth periods.
Radical Farm Reform Needed to Continue Self-Sufficiency Paradigm

For wheat and rice, growth for both production and yields is declining, while these areas have been highly volatile for pulses (see figure). India has seen a loss of about nine million farmers since 2001 and around 15 million since 1991. If this trend continues, per-farmer output will have to increase by more than 70 percent by 2025. From 2001 to 2011, the increase in farmer productivity was around 30 percent. While there are some benefits of reduced farmer participation, including the increase in average landholding size and the resulting ability to generate better returns on investments, such a huge increase in productivity will need radical farm-level reform, potentially including the following:

- Improving government’s agricultural extension services or potentially allowing private sector players to play a major role
- Driving investment in agricultural R&D and technology improvements to improve per-farmer yields
- Improving farmer access to credit

Figure

Growth has been declining for rice and wheat and volatile for pulses

(% growth for 10-year periods)


In addition, substantial gaps in availability of livestock feed supply and competition for acreage from food crops pose fundamental threats to necessary dairy production.

- The fruits and vegetables and meat and poultry segments have seen rapid growth over the past two decades, but this is expected to stagnate with increased competition for usable land. In addition, the threat of the more lucrative export markets could also divert food supply away from domestic food availability, or more significantly, away from segments such as food grains, edible oils, and dairy products, which run the risk of shortages by 2025.

Awareness

Nutritional access is only part of the overall nutrition story. To ensure improved nutritional outcomes, consumer awareness is vital. Despite having no constraints on availability, affordability, or quality and safety, the top 30 percent of the urban population consumes more than the recommended dietary guidance of fats. Excess fat intake can be a major factor for higher...
Risk of cardiovascular diseases. Though consumption choices are ultimately in the hands of the consumer, government and industry have a major role to play in communicating nutrition recommendations to consumers. Improved awareness can help in several ways:

- Addressing regional pockets with high micronutrient deficiencies (see sidebar: A Community Strategy for Addressing Vitamin A Deficiency in Indonesia)

### A Community Strategy for Addressing Vitamin A Deficiency in Indonesia

Faced with developing a communication strategy for a national vitamin A program covering more than 13,000 islands and a range of microclimate and food zones, the SOMAVITA Project in Indonesia realized the importance of catering to the country’s geographical, climatic, and cultural diversity in developing a consumer awareness strategy. A decentralized research and strategy development approach was followed to identify one target food in each region, which was then promoted at a district level, including innovations such as promotion of recipes rich in target foods. For example, a quantitative feasibility analysis identified the 10 best food sources of vitamin A on the basis of availability and price. The list was then winnowed to five by considering consumer preferences and perspectives on use and preparation of foods and household consumption patterns. Finally, nutritionists and social marketing experts selected one food to promote in each region, ultimately providing a variety of recipes to citizens.
Feeding a Billion People: The Role of the Food Processing Industry

The Gradual Shift Toward Packaged Foods

Fresh or unpackaged foods dominate the food basket of most Indian consumers. However, increasing urbanization, income, and education levels are driving a gradual shift toward packaged foods. Several segments such as tea, coffee, salt, pulses, and spices, which have traditionally been sold loose, are increasingly being sold as packaged products. For mass-market penetration beyond upper-income households, the greatest challenges will be to ensure affordability of these products and generate awareness around the benefits in quality, safety, and nutritional aspects of these products (see figure). Many consumers will have to be convinced to pay a premium (albeit a small one) for the intangible benefits.

Figure

Packaged foods have benefits over traditional loose foods

<table>
<thead>
<tr>
<th>Benefit and value addition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
</tr>
<tr>
<td>- Sufficient content of critical micronutrients, especially iodine</td>
</tr>
<tr>
<td>- Low sodium salt options help lower risk of lifestyle diseases</td>
</tr>
<tr>
<td>Tea and coffee</td>
</tr>
<tr>
<td>- Better quality and standardized products</td>
</tr>
<tr>
<td>- Healthy options such as decaffeinated and increased antioxidants</td>
</tr>
<tr>
<td>- Wider range of choices, such as flavored teas</td>
</tr>
<tr>
<td>Pulses</td>
</tr>
<tr>
<td>- Better nutrient retention through alternate processing (for example, non-water and oil polishing)</td>
</tr>
<tr>
<td>- Modern and scientific sorting and grading for purity</td>
</tr>
<tr>
<td>Wheat flour</td>
</tr>
<tr>
<td>- Fortification of flour through addition of vitamins, minerals, and iron</td>
</tr>
<tr>
<td>- Use of better quality wheat (such as whole wheat)</td>
</tr>
<tr>
<td>- Branded Atta flour now makes up 3 percent of total market</td>
</tr>
</tbody>
</table>

Source: A.T. Kearney analysis

- Enabling consumer avoidance of identified food quality and safety issues
- Enabling better decision making in food choices for daily energy, protein, and fat intake (for example, improving the balance of consumer diets)
- Driving market demand for new products, which enables wider choices, better quality products, and creation of new food segments (see sidebar: The Gradual Shift Toward Packaged Foods)

Affordability

Closely linked to availability, affordability is extremely important for a society with as much income disparity as India. The share of food in total consumer spending is as high as 62 to 65 percent for the lowest income classes but as low as 30 to 40 percent for the upper income classes (see figure 12 on page 16). At around half of monthly per capita income spent on food, India ranks 17th in the group of lower middle income countries, behind even Sri Lanka and Pakistan. For Brazil and China, 20 to 40 percent of household budgets are typically spent on food. The huge share of food—a basic human need—in most household budgets means it is crucial that people are able to buy food at the lowest available cost. Undernourished households will see their food expenditure rise to as high as 82 percent for the lowest income class in rural India and nearly 70 percent for the lowest income class in urban India, leaving little income for expenditures above that needed for basic subsistence.9

9 For full nutrition for an adult male in the 20–39 age group, assumption is a per-day intake of a minimum of 2,400 kilocalories in rural areas and 2,100 kilocalories in urban centers.
Cereals are by far the most cost-effective source of dietary energy. For example, the price per 1,000 kilocalories ranges from INR 65-75 for meat and poultry compared to INR 4-5 for cereals. As a result, cereal is the dominant diet component, especially for lower income groups. Fruits and vegetables are much more expensive (INR 28-40), but they are essential sources of micro-nutrients that are widely deficient in the population. The generally observed trend is that increasing incomes leads to diet diversification—away from staple grains and toward higher-cost foods such as poultry, fruits and vegetables, and dairy products. With increasing demand for edible oils, fruits and vegetables, dairy products, and meat, it is important to ensure affordability for these segments. This has, however, not been the case for most of these segments in the past few years. Meat and poultry, vegetables, and milk experienced higher inflation rates than staple grains, with the exception of pulses (see figure 13 on page 17). Price increases in these segments will slow the diet diversification trend and limit improvements in micronutrient and protein deficiency levels. The lack of government involvement in procurement and distribution for these segments means the private sector has an important role to play.

**Access**

A strong distribution system is crucial to ensuring adequate access to food across the country. India has a fairly strong distribution network, including a public distribution system for grains and cereals and a diverse private distribution system across food segments. Organized players have deep access across urban and non-urban centers. This is complemented by an even wider network of traditional distribution channels across all categories, including grains and cereals, fruits and vegetables, milk, and meat and marine products. However, there is a challenge in

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*Source: National Sample Survey Office Survey of Consumer Expenditure 2011-12, Nutrition Intake in India 2009-10; A.T. Kearney analysis*

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Figure 12

**Low-income classes spend a larger share of their income on food**

![Diagram of income decile and % of income spent on food](image-url)

1) The full nutrition level is assumed to be 2,600 kilocalories for rural and 2,100 kilocalories for urban demographic for an adult male.
2) 90–100 represents the highest average income level, and 0–10 represents the lowest.

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16
ensuring adequate quality and safety in both the public distribution system and other public systems. Schemes such as midday meals for school children face major challenges in ensuring safety and quality, as seen recently. While this report does not consider all aspects of distribution in detail, some aspects such as safety and quality at the pre-distribution stages of the value chain are discussed. The role of the Food Safety and Standards Authority of India (FSSAI) is also touched upon, which is relevant across the food value chain.

Quality and safety

India’s cereal- and pulse-heavy diet lacks micronutrients. In addition, a large portion of nutritional value is lost in India’s long, unorganized food supply chain because of spoilage and poor processing technology. For example, traditional pulse processing (polishing) typically involves water polishing, which adds to pulse weight and decreases nutrition per gram. While diet diversification will occur gradually with increasing incomes, there is an imminent need to improve the quality of food consumed by most of the population. For example, fortifying flour to replace micronutrients lost in the milling process would go a long way toward reducing deficiencies among lower income classes. Food fortification, which provides targeted micronutrients to address gaps in typical diets of local populations, is a highly effective way to address deficiencies. It offers greater speed of improvement than diet diversification, which requires a fundamental change in consumer habits or aggressive consumer education programs, and is likely to be more effective than direct micronutrient supplementation programs, which can provide the fastest improvements but may be relatively expensive and highly dependent on good implementation.

Availability of quality foods is also relevant for the other end of the income spectrum, which is exposed to the risks of overconsumption. With an increasing global focus on obesity and related lifestyle diseases, the availability of a wide variety of quality, healthy food options is essential to provide well-off consumers with better choices. For example the current trend of increasing consumption of organic foods illustrates the importance of quality choices for consumers. This segment has seen a 95 percent increase in organic food spending in the past five years, according to a recent survey of high-income households by the Associated Chambers of Commerce and Industry of India.

In addition to the basic nutrition quality of food, India faces several other quality and safety challenges:
• **High adulteration.** This is most notable in milk. A 2011 FSSAI study identified non-conformity to food safety standards in more than 68 percent of samples tested. Similarly, around 20 percent of food samples randomly tested in a recent government study was found to be substandard or adulterated.

• **Abuse of substances.** Given India’s large unorganized sector and value chains with several levels of intermediaries, quality control of food is extremely difficult. For example, the recent trend has been to use calcium carbide, a carcinogenic agent, to accelerate ripening of fruits.

• **Poor hygiene and safety practices.** The large presence of the unorganized sector also limits oversight into the standards of processes followed from agricultural production to processing and distribution. For example, municipal slaughterhouses in India are widely known to follow unhygienic floor slaughter processes. They also have limited safety processes such as ante- and post-mortem inspections by veterinarians.

Although FSSAI has been instrumental for licensing, regulation, and consumer awareness, it faces significant challenges in the form of inadequate resources (software, hardware, and manpower), poor infrastructure, and the gap between existing products and international standards. Of around INR 5,000 crore estimated as necessary to upgrade infrastructure and manpower, around INR 2,000 crore has been allocated as part of the 12th Five Year Plan. This will enable FSSAI to reach targeted levels of one lab for every 20 districts in India and handle the nearly 50 million licenses currently pending.

A summary of the high-level imperatives across various food categories is provided in figure 14. Availability, affordability, quality and safety, and consumer awareness are the four pillars supporting an improvement in India’s nutrition future. Issues in each area have contributed to India’s nutritional challenges. Availability and affordability limitations for lower-income groups have led to persistent undernourishment; a lack of awareness and issues with food quality have driven overnutrition in upper income groups; and all four contribute to the high rate of micronutrient deficiencies. The underlying structural causes of these gaps and some limitations in addressing them are explored in detail and will need to be addressed to secure India’s nutrition future.

### Figure 14

**Imperatives for improving access to nutrition in India**

<table>
<thead>
<tr>
<th>Food segment</th>
<th>Availability</th>
<th>Awareness</th>
<th>Affordability (especially pulses)</th>
<th>Quality and safety (micronutrients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains and pulses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy and dairy products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits and vegetables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat and poultry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edible oils</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: A.T. Kearney analysis
Challenges for the Food Industry

Eight challenges need to be addressed for the food industry to achieve the availability, affordability, and quality and safety goals needed to feed India’s population. These challenges span the food value chain from production and farming to retailing and consumption and have differing relevance for each food segment (see figure 15).

**Source:** A.T. Kearney analysis

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### Key challenges

<table>
<thead>
<tr>
<th>Farming and production</th>
<th>Limited ability to control quality and safety</th>
<th>Limited availability of skilled resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slowdown in farm production growth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited alignment and clarity of production incentives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low coverage of organized procurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor procurement and supply-chain infrastructure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low value-added in processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low consumer awareness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Slowdown in farm production growth

India’s highly fragmented farming landscape with low average farm sizes is a major challenge in quantum improvements in farm-level productivity. India has among the world’s lowest average farm sizes, which leads to an inability to invest in improving productivity. For example, a one-hectare farm has a mere INR 9,000–10,000 of income above the poverty line. A farm size of at least 0.65 to 0.8 hectares is needed to break even. With around 67 percent of landholdings being marginal (less than one hectare), with an average size of 0.4 hectares, more than half of marginal farmers are not likely to have any income to spare beyond subsistence. However, the bottleneck of small landholdings can be overcome, as illustrated by other Asian countries, which have even smaller average sizes but higher yields of major crops (see figure 16 on page 20). South Korea, for example, witnessed an explosion in mechanization as a result of training, the establishment of farm machinery service centers in rural areas, the promotion of cooperative machinery ownership and utilization, and government programs ensuring access to credit. In addition, increasing levels of contract farming led to large-scale de-facto consolidation of land holdings (without transfer of land title), enabling greater farm investment. The challenge in India lies in the lack of success of agricultural extension services, limited
While able to cover the larger farms, agricultural extension services in India are unable to provide support to the numerous small landholdings because of the sheer scale needed. Anecdotal evidence indicates that extension officer visits may be as infrequent as once in six months. Although India has one of the largest public agricultural research systems, spending is lower than in other countries. For example, India spends 0.4 percent in agriculture R&D compared to China (0.5 percent), Brazil (1.8 percent), South Korea (2.3 percent), and Japan (4.8 percent). Farmer access to credit is also a challenge, with total credit growth showing a declining trend from 2006–2007 onward. The share of farm holdings up to 2.5 acres was only around 27 percent as of 2008, while such farm holdings cover more than 45 percent of land under cultivation.

Livestock farming is suffering from a gap in sufficient feed and fodder supply, varying from 35 to 57 percent of actual demand (see figure 17). This is one of the crucial gaps in improving

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**Figure 16**

**Despite being small, Asian farms produce high yields**

**Average landholding size for Asian economies**

<table>
<thead>
<tr>
<th>Country</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>1.20</td>
</tr>
<tr>
<td>India</td>
<td>1.16</td>
</tr>
<tr>
<td>South Korea</td>
<td>1.00</td>
</tr>
<tr>
<td>China</td>
<td>0.60</td>
</tr>
</tbody>
</table>

**Average yields for major crops**

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th>India</th>
<th>South Korea</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>4.1</td>
<td>3.2</td>
<td>3.5</td>
<td>4.8</td>
</tr>
<tr>
<td>Rice (milled equivalent)</td>
<td>3.5</td>
<td>2.5</td>
<td>1.8</td>
<td>5.0</td>
</tr>
<tr>
<td>Maize</td>
<td>2.4</td>
<td>1.2</td>
<td>1.1</td>
<td>1.8</td>
</tr>
<tr>
<td>Groundnut</td>
<td>1.7</td>
<td>2.4</td>
<td>1.1</td>
<td>2.6</td>
</tr>
<tr>
<td>Soybeans</td>
<td>1.7</td>
<td>2.4</td>
<td>1.1</td>
<td>2.6</td>
</tr>
</tbody>
</table>

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1 Landholding size for India is per Agriculture Census 2011. For other countries, estimates are from 1995 to 2000. Sources: Food and Agriculture Organization Production Yearbook, FAOSTAT, India Agriculture Census 2011; A.T. Kearney analysis

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Implementation of better farming techniques, limited R&D spending, limited farmer access to credit, and the inability to leverage scale through consolidation of demand for input.

Despite being small, Asian farms produce high yields

---

**Figure 17**

**India’s livestock farmers face a gap in feed and fodder supply**

**Dry matter (million tons)**

<table>
<thead>
<tr>
<th></th>
<th>Demand</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry fodder</td>
<td>416</td>
<td>253</td>
</tr>
<tr>
<td>Green fodder</td>
<td>222</td>
<td>143</td>
</tr>
<tr>
<td>Concentrate</td>
<td>53</td>
<td>23</td>
</tr>
</tbody>
</table>

Sources: Ministry of Animal Husbandry, Dairying and Fisheries Annual Report 2012-13; A.T. Kearney analysis
farm-level productivity of livestock. For example, as per planning commission estimates, around 50 percent of the gap between potential livestock productivity and actual realized productivity is driven by deficiency in feed and fodder availability. However, improving feed availability will be difficult with competing pressures on land from cash crops and food grains. Improvements in yield and better use of land devoted to feedstock will be needed to address this deficit.

**Limited alignment and clarity of production incentives**

While government involvement in procurement and distribution of non-perishable foods, including staple food grains and oilseeds, is crucial for food security in India, it is also a major source of demand-supply mismatches in food value chains (see figure 18). Through the 1990s, minimum support price (MSP) increases for rice, wheat, and other food grains outstripped increases for oilseeds. The high level of government procurement (estimated to be around 30 to 40 percent of total food grain production) drove increasingly favorable returns from food grains and resulted in diversion of land away from oilseeds. In the 2000s, when oilseed MSPs increased more than that of food grains, oilseed cropping increased accordingly. However, this distortion of incentives led to a huge increase in import dependence, with edible oil imports rising from 3 percent in 1992 to around 50 percent by 2000 and 57 percent today.\(^\text{10}\) The huge impact that government price setting and procurement can have on crop patterns highlights the need for an integrated strategy from agricultural production to consumer nutritional demand in order to ensure sufficient food across income classes. Alternatively, better demand-supply matching can be attempted through the involvement of private players. For example, contract farming would give an assured market for farmers and hence improve the influence of private sector demand signals on the farmer crop production.

**Figure 18**  
Non-perishable foods are a major source of demand-supply mismatches

**Rice and wheat average minimum support price**  
(INR per quintal)

<table>
<thead>
<tr>
<th>Year</th>
<th>1991</th>
<th>2001</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSP</td>
<td>215</td>
<td>535</td>
<td>825</td>
</tr>
</tbody>
</table>

**Rice and wheat area under production**  
(million hectares)

<table>
<thead>
<tr>
<th>Year</th>
<th>1991</th>
<th>2001</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>67</td>
<td>70</td>
<td>72</td>
</tr>
</tbody>
</table>

**Oilseeds average MSP**  
(INR per quintal)

<table>
<thead>
<tr>
<th>Year</th>
<th>1991</th>
<th>2001</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSP</td>
<td>518</td>
<td>1,018</td>
<td>1,857</td>
</tr>
</tbody>
</table>

**Oilseeds area under production**  
(million hectares)

<table>
<thead>
<tr>
<th>Year</th>
<th>1991</th>
<th>2001</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>24</td>
<td>23</td>
<td>27</td>
</tr>
</tbody>
</table>


\(^{10}\) Other factors drove the increased import dependence, including reduction of duties on imports. However, this was done to protect consumers once it became clear that edible oil production in the country would not be able to meet demand. Import duties were as high as 88 to 99 percent in 2008, when imports were similarly high at around 50 to 57 percent.
Government also plays a role in other incentive signals that impact production. For example, the reduced import duty on edible oil imports negatively impacts the incentive for farmers to increase local oilseed production because of the cost competitiveness of imports. A balanced import duty regime that seeks to protect consumers while reducing import dependence could ensure this.

**Minimal organized procurement and limited transparency in the setup**

Access to organized procurement can be important to improving food production and food availability by providing farmers a better guarantee of volumes and better price realization per unit sale. For example, the dairy cooperative movement was central in transforming the fragmented rural milk production industry from self-consumption and local sale to consistent marketable surplus. Even in the case of dairy cooperatives, coverage of farmers is still low. Only around 8 percent of milk production in India flows through organized cooperatives, with 92 percent sold loose or to private players.

In segments such as fruits and vegetables, which are regulated by a variety of Agricultural Produce Market Committee (APMC) acts across states, the result of limited organized procurement is a long and inefficient supply chain. The presence of multiple intermediaries between farm and fork leads to waste in the supply chain, price increases from non-value-adding activities, and deteriorating quality (see figure 19). Farmers also tend to get lower realizations from unorganized procurement because of a lack of competition and product spoilage. For example, licensing regulations are a major entry barrier for private players, which could increase competition and possibly improve realizations for farmers. In addition, a large share of commissioning agents also finance farmers’ production through short-term loans, indebting farmers and leading to lower sale prices for farm produce. A study by the Indian

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**Figure 19**

**Intermediaries between farm and fork increase prices and create waste**

<table>
<thead>
<tr>
<th>Price buildup in value chain for five vegetables¹</th>
<th>Illustrative: Andhra Pradesh</th>
</tr>
</thead>
<tbody>
<tr>
<td>(% of final consumer price)</td>
<td></td>
</tr>
<tr>
<td>Non-essential activities</td>
<td>20%</td>
</tr>
<tr>
<td>Essential activities</td>
<td>11%</td>
</tr>
<tr>
<td>Village merchant</td>
<td>14%</td>
</tr>
<tr>
<td>Middlemen</td>
<td>15%</td>
</tr>
<tr>
<td>Wholesaler</td>
<td>12%</td>
</tr>
<tr>
<td>Commission agent</td>
<td>17%</td>
</tr>
<tr>
<td>Farmer’s market</td>
<td>11%</td>
</tr>
<tr>
<td>Retailer</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waste reduction in value chain for fresh produce</th>
<th>Illustrative: Modern retailer in Tamil Nadu</th>
</tr>
</thead>
<tbody>
<tr>
<td>(% of waste in supply chain)</td>
<td></td>
</tr>
<tr>
<td>Traditional value chain</td>
<td>15–20%</td>
</tr>
<tr>
<td>Direct procurement from farmer</td>
<td>5–10%</td>
</tr>
</tbody>
</table>

¹Tomato, cabbage, brinjal, okra, and beans
Sources: Agricultural Economics Research Review 2010, interviews; A.T. Keamey analysis
Council for Research on International Economic Relations suggests that farmers selling directly to organized retailers can see a 20 to 30 percent improvement in price realization and as much as 60 percent improvement in profits relative to the regulated Mandi route.

The current wholesale market format suffers from a major challenge on the issue of transparency. With no data on volumes, prevailing prices, or inventory levels, there is little information for either buyers or sellers to make informed decisions. This information gap is a major barrier to the entry of new players and hence increased competition and better price discovery. Improved transparency is crucial to more efficient markets within the current framework.

**Poor procurement and supply-chain infrastructure**

A variety of factors contribute to the poor infrastructure levels in the food supply chain, including numerous unorganized players in the supply chain, commercial viability challenges, and more consumer demand for fresh or live-cut produce (see figure 20). As a result, regional imbalances in food production and demand become difficult to address. For example, the high share of wet markets for poultry—estimated to be as high as 80 to 90 percent—limits the ability to shift poultry from excess to deficit regions because of the high mortality and shrinkage associated with transporting live birds. Limited infrastructure also increases supply chain waste and reduces quality and nutrition levels. For example, waste in the fruits and vegetables sector is estimated to be 6 to 18 percent in the post-harvest portions of the value chain. Similarly, the absence of farm-level infrastructure for measurement, testing, immediate chilling, and storage of milk results in a high level of self-consumption or sale in local markets, which reduces marketable surpluses.

A good example is the current state of the country’s cold-chain infrastructure. The gap to demand is around 38 million tons, against an installed capacity of around 24 million tons. With waste in the fruits and vegetables supply chain estimated at INR 44,000 crore, the investment requirement of INR 26,000 crore to install 38 million tons of cold-chain storage would seem plausible. However, even with government incentives to invest in cold chain, these projects have seen limited progress. This is especially true for third-party logistics operators for which

| (million tons) |
|---|---|
| **Cold storage** | Capacity | 24 | Gap to demand | 38 |
| **Warehouses** | 85 | 50 |

**Challenges to improving cold chain infrastructure**

- Poor commercial viability for private third-party logistics players
- Lack of scale for upstream private players in food value chain, such as modern retailers, leading to limited commercial viability
- Constraints of conventional public-private partnership and viability gap funding model
  - Land ownership and inclusion in project costs
  - Need for upfront tariff fixation and limits on other sources of revenue such as price arbitrage
  - Limits on viability funding up to 40 percent of project costs
- Limited monopoly benefits

Note: Capacity and gap estimates from 2010
Sources: Ministry of Food Processing Industries and Federation of Indian Chambers of Commerce and Industry Cold Chain Consultation 2013
market remuneration would not provide suitable returns on investment. Investment in cold storage will most likely require involvement of players already involved in the value chain, including upstream players such as retailers and downstream players in production and procurement. However, for these players, too, the fundamental absence of demand because of consumer preferences for fresh produce and the higher cost of frozen food means that alternative approaches will likely be needed to address this issue in the short run. These could include, for example, improving government contributions to viability gap funding, allowing for private trading to improve returns, and enabling lower cost of frozen foods through lower packaging costs or cold-chain operating costs.

Processing and retail players could play an important role in addressing this infrastructure deficit. Being closer to consumers and having better knowledge of demand trends, they would be best placed to invest in infrastructure that might be unviable in the short term but can deliver long-term benefits. Processing players also have a role in driving awareness and hence end-consumer demand. Convincing consumers to pay premiums for better-quality products will be crucial to improving demand, a lack of which is the fundamental challenge underlying current commercial unviability of infrastructure investment. A concerted push to increase demand through awareness, while simultaneously investing in infrastructure to make products available, is best done through large processing players with end-to-end visibility.

**Low value-add in processing**

There is major fragmentation of food processing capacity, with a large unorganized segment and widespread use of primitive processing. This results in lower value-add at the processing stage, especially from a nutritional point of view. Powerful ideas such as fortification of flour with micronutrients that have been adopted globally would be difficult to implement and monitor in India given this large unorganized presence and difficulty ensuring the adoption of improved technology.\(^{11}\) For example, the 58 percent of iron currently lost in India during the processing of 15 to 18 million tons of wheat to flour could ensure a daily availability of up to 50 milligrams of iron per capita—almost double the recommended dietary allowance of 30 milligrams (see figure 21). Consumer sensitivity to high prices means that adding value, which would

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**Figure 21**

**Much of the iron and folic acid in India’s wheat is lost during processing**

**Typical nutrients lost when milling wheat into flour**

(\% of initial nutrient level per gram)\(^ {1^1}\)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Loss %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>58%</td>
</tr>
<tr>
<td>Folic acid</td>
<td>67%</td>
</tr>
</tbody>
</table>

\(^{1^1}\)Assuming an extraction rate of flour from wheat of 75 percent
Sources: Flour Fortification Initiative; A.T. Kearney analysis

\(^{11}\)About 75 countries have regulations mandating fortification of flour through the addition of iron or folic acid.
increase the cost of foods, is difficult. Lack of scale limits the ability to increase value addition through cost-effective adoption of new technologies. The processing industry also has limited incentives to drive this. For example, under current regulation, a premix of ingredients for fortification would incur a value-added tax, whereas tax breaks have helped improve cost-effectiveness in global examples.

Overregulation of larger processing players is also a challenge to increased processing value addition. For example, harmonizing Indian regulations with global standards such as Codex would enable greater flexibility for food processors—such as enabling cost reduction—thereby ensuring consumers don’t discount higher-quality, safer options purely because of prohibitive costs. In addition, this limits the role of the processing industry by preventing the ease of translating globally successful new food products in the Indian market. Harmonized regulations could vastly increase the choices and quality of foods available to domestic consumers while potentially improving affordability by allowing processors to leverage global scale, reducing long testing lead times and additional re-testing costs.

**Limited ability to control quality and safety**

While India does have strong food safety laws and an organization tasked with ensuring food safety and quality, there are major gaps in implementation. The sheer number of players in the food value chain, especially in the large unorganized segment, makes implementation of quality and safety norms difficult. In the meat industry, for example, India has 4,000 registered slaughterhouses and 25,000 unregistered slaughterhouses. Unregistered slaughterhouses aren’t regulated, have poor hygiene levels, and lack basic facilities such as drainage and waste disposal. In addition, poor pre- and post-inspection practices as a result of the absence of veterinary staff also affect quality. As a result, microbial contamination and contamination from dung and soil pose significant health risks to domestic consumers. A slaughterhouse modernization program is targeting some of these challenges as part of the 11th and 12th Five Year Plans.

The food safety challenge spans the value chain. For example, the highly unorganized supply chain for perishables limits the ability to effectively control safety. This has led to practices such as milk adulteration and use of carbide for fruit ripening becoming more widespread. The need to offload all fresh produce to minimize losses means that poor quality food is also sold off. At the farm level, excessive use of pesticides and fertilizers and inadequate cleaning during the post-harvest stage result in harmful chemical residues entering the food value chain.

**Limited availability of skilled resources**

The severe shortage of skilled manpower across the food value chain presents a major challenge. For example, a significant factor of higher milk production is targeted productivity improvement through artificial insemination. The delivery system is resource-intensive, requiring around 259,000 para-veterinarians and other support staff to drive work at labs and directly to farmers. Against this requirement, only 52,000 were available per the 12th Planning Commission working group, a shortage of 80 percent. At the food processing stage, resource skills and knowledge are also a major challenge, with lack of awareness about food regulations resulting in high downstream rejection rates, especially with unorganized suppliers. Without substantial investment in skill development across the value-chain and including R&D and technology, this could become a serious bottleneck.
Minimal consumer awareness

Consumer awareness is an essential aspect of an improved nutritional situation in the country. Consumers lack awareness about several nutritional and food-quality aspects, most notably insistence on primarily fresh produce resulting in exposure to health risks and low-quality foods. Low consumer demand also limits improvements across the value chain for perishable goods. There is limited knowledge about fundamental micronutrient deficiencies in the Indian diet and about how consuming certain foods can address this gap, for example fruits and vegetables, meat and poultry, and fortified processed foods. Also, consumers’ aversion to processed foods as fundamentally unhealthy is limiting the industry from improving food variety or adding new healthy food segments. Educating consumers about the need to increase consumption of better-quality, safer foods and increase targeted micronutrient intake can drive improvements in the country’s nutrition situation while providing the impetus for back-end improvements in the respective industries.

Imperatives for Food Security in India

The country is facing several challenges across food value chains that impact food availability, affordability, quality and safety, and consumer awareness. Many government and private initiatives are in place to help overcome these challenges. However, success so far has shown mixed results because of the scale of the industry, limited resources, and implementation gaps.

A fresh look at the existing initiatives can help improve effectiveness and remove impediments to implementation. Success will require private enterprises and government to focus on the following 11 initiatives mentioned at the beginning of this paper:

1. Increase the commercial viability of production

Many food chains in India suffer from a lack of adequate scale in production, which limits farmers’ ability to invest in new technology or improve productivity. Alternate models such as contract farming, corporate farming, and cooperative farming can help address these issues with availability of new technologies, production practices, and greater access to financing. Contract farming can also mean greater control of quality and price of supply for private players (see figure 23 on page 27). These models will be especially relevant for food chains that face issues of limited farm extension services and credit support or when there is a need to introduce new crops. The success of contract farming depends on the enforceability of contracts, which is a significant bottleneck.

Government and private players will need to work together to identify and implement contract farming on a large scale. Government will need to ensure an effective mechanism for contract enforcement and grievance redresses for all stakeholders. Protecting the rights of small farmers is another area where government needs to take an active role. Private players can develop relevant contract farming models for various crops and geographies. For example, entities such as banks and input providers can address specific challenges faced by the region.

2. Leverage public-private partnerships to increase the effectiveness of farm extension services

Government already plays a key role in several food chains, including perishables, through its farm extension services. While this has resulted in many benefits, there are key gaps in quality
and availability of farm services, and the public provision of services has been inadequate in many areas. Widely dispersed farmers can be hard to reach, and their information requirements vary significantly. In addition, there are issues in performance and accountability in existing mechanisms. Recent studies in Uttar Pradesh show that only 18 percent of farmers have access to extension services from any source. Within this context, public-private partnerships can play an important role in making these services more effective. Several countries have explored different models for farm extension service reforms (see figure 24). A private partnership model, where services are financed by government but delivered through private enterprises or

### Figure 23
**Contract farming can provide more control over quality and prices**

<table>
<thead>
<tr>
<th>Private enterprise</th>
<th>Overview</th>
<th>Advantages (for private players and farmers)</th>
<th>Geographic scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahindra Krishi Vihar</td>
<td>• Supply of quality inputs; technical guidance for rice production</td>
<td>• Assured availability of produce at fixed prices</td>
<td>Chhattisgarh</td>
</tr>
<tr>
<td></td>
<td>• Purchase produce at predetermined prices</td>
<td>• Guaranteed quality</td>
<td></td>
</tr>
<tr>
<td>Himalayan International Limited</td>
<td>• Supply of farm practices; inputs for herb production</td>
<td>• Assured availability of produce at fixed prices</td>
<td>Himachal Pradesh</td>
</tr>
<tr>
<td></td>
<td>• Quality monitoring</td>
<td>• Guaranteed quality</td>
<td></td>
</tr>
<tr>
<td>Tata Chemicals and SBI</td>
<td>• Supply of farm inputs and practices for grape production</td>
<td>• Guaranteed quality</td>
<td>Maharashtra</td>
</tr>
<tr>
<td></td>
<td>• Assured availability of produce at fixed prices</td>
<td>• Easy access to crop loans</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Guaranteed quality</td>
<td>• Farmers can also sell to local markets</td>
<td></td>
</tr>
<tr>
<td>Frito-Lay India</td>
<td>• Supply of farm practices; inputs for potato cultivation</td>
<td>• Assured availability of produce at fixed prices</td>
<td>West Bengal</td>
</tr>
<tr>
<td></td>
<td>• Increased farm productivity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: Corporate Catalyst India, A.T. Kearney analysis

### Figure 24
**Models for reforming farm extension services**

<table>
<thead>
<tr>
<th>Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Revise public sector extension via downsizing</td>
<td>• Improve cost recovery via fee-based systems</td>
</tr>
<tr>
<td>• Country examples: Canada, Israel, and the United States</td>
<td>• Country examples: OECD countries and Mexico</td>
</tr>
<tr>
<td>Private</td>
<td></td>
</tr>
<tr>
<td>• Build public-private partnerships</td>
<td>• Increase privatization and commercialization</td>
</tr>
<tr>
<td>• Country examples: Chile, Estonia, Hungary, Venezuela, South Korea, and Taiwan</td>
<td>• Country examples: Netherlands, New Zealand, England, and Wales</td>
</tr>
</tbody>
</table>

Sources: Food and Agriculture Organization, A.T. Kearney analysis

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non-governmental organizations (NGOs), has been implemented in several countries (see sidebar: Venezuela: A Model for Extension Services).

To enable these models, government will need to assess the effectiveness of the current extension services and identify the regions and crops that face major issues in service delivery. In addition, it will need to develop administrative and monitoring mechanisms to track performance of private players and NGOs that provide extension services. Success of this model will require private players to identify effective low-cost extension models for delivery based on public financing.

3. Invest in R&D and technology to improve yields and nutrients and reduce waste

The need for R&D and modern technologies is most important during production and processing. During production, it is crucial to counter the challenges of plateauing yield growth, increasingly scarce resources such as land and water, and rapidly deteriorating quality of soil among others. Investing in R&D and technology is essential to drive the much-needed second green revolution in India. For example, extraordinary success stories such as the use of System of Rice Intensification (SRI) techniques in states such as Bihar and Tamil Nadu should be built upon through pilots in other states and sharing of best practices. There is a need for sustained investment of all value-chain players in continually improving the factor productivity of agriculture, be it through high-yield seed varieties, better cultivation techniques, or waste reduction during harvest.

During processing, small-scale and unorganized sectors, which account for a substantial portion of the food processing industry, need targeted programs to improve productivity and access to technology, credit, and downstream markets. This will help reduce waste and nutrition losses during processing. Programs could include financial assistance for procurement of machinery and credit, technical advice on productivity improvement and machinery selection, and training for adopting standardized processes. Linking these incentives to actual waste reduction and nutrient quality improvement, while ideal, would likely be difficult to implement without the involvement of private-sector organized players in the value chain.

4. Increase transparency of price, volume, and inventory in wholesale markets

This is most relevant for foods sold through the government-regulated Mandi route, primarily fruits and vegetables. The main improvement needed is transparency of transactions to enable effective and efficient demand-supply matching. Several aspects need to be addressed,
primarily transaction coverage and data reliability. Technology can be a useful aid in this scenario. For example, in Thailand’s Phitsanulok Agricultural Central Market, weighbridges are linked to computers. This enables immediate invoicing for tolls and automatic generation of sales records, and it ensures reliability of volume data. In India, it is difficult to have real-time price data available for all transactions because of the large share of secret bidding transactions. However, better knowledge about volume and inventory data can allow more accurate price estimations and reduce opportunities for collusion.

The role of government is crucial. A policy framework for ensuring transparency and an effective monitoring mechanism need to be developed. Private players need to support government efforts through active flagging of transparency issues and investments in improving markets where they have long-term interests.

5. Simplify the regulatory environment

Addressing the regulatory complexity of India’s food value chain needs to be a priority, with focus on two areas:

- **Accelerate standardization of regulations across states.** Lack of standardization leads to higher costs and creates longer timelines for companies that operate across states. Standardizing regulations such as APMC acts across states is thus essential to improving efficiency of the food value chain.

  The Ministry of Agriculture has recommended that states amend the APMC act along the lines of the Model Act to facilitate development of agricultural marketing infrastructure through private sector investments. This will enable alternate marketing channels for farmers for selling their produce where prices are remunerative for them. However, there is no stipulated timeframe for implementation; only a few states have amended regulations per the Model Act, and even fewer have implemented it. Some states such as Himachal Pradesh and Andhra Pradesh have already implemented contract farming and direct marketing, leading to better prospects for farmers; others have done only partial implementation or have not initiated any action. Implementation timelines need to be stipulated and implementation support rendered by the Ministry of Agriculture.

- **Align India’s food safety regulations with globally accepted standards.** The difference in standards leads to higher costs and longer timelines for players looking to import ingredients into India and high rejection rates for export-focused businesses. The FSSAI is reviewing existing food safety standards with respect to Codex standards and standards of other countries to identify areas requiring harmonization. As per the planned timelines, the draft of standards of codes and practice was expected to be complete by 2013, and adoption of such standards and notifications is expected to happen by December 2014. FSSAI must adhere to these timelines to ensure the rapid implementation of harmonized standards.

  The role of government is of primary importance in driving the adoption and standardization of regulations in a timely manner. Private players need to support policy efforts through continued advocacy. For example, a detailed understanding of the economic benefits of the domestic food market can drive greater urgency in adopting regulations.

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13 The Food Safety and Standards Authority of India
6. Increase the commercial viability of organized supply chains

Supply-chain infrastructure is inadequate for many categories, including fruits and vegetables, which can lead to a loss of nutrient value. Even though government incentives support new investments, there is a limited business case for third-party logistics players in areas such as cold chain. The food processing industry can play a central role in building supply-chain capabilities as their presence across the value chain will help in better benefit realization of improvements in supply-chain efficiency. Collaboration among retail players and logistics operators, along with support from the government, can effectively drive organization levels and efficiency of supply chains. Consider Thailand. The country’s fruit and vegetable market was fragmented and unorganized, with a limited share of modern retail in fresh produce (11 percent of fruit and vegetable buyers and just 7 percent of fresh produce trading). Several public-private partnerships led to establishment of the Fresh Distribution Center and the Thai Fresh Project, along with sharing of best practices by the U.S. Department of Agriculture and logistics firm EMO Trans. The result: export growth went from eight years of stagnation to 25 percent CAGR by 2006.

Government will also need to play its part by developing specialized models to support investments. For example, changes to viability gap funding models, land acquisition and holding requirements, and public-private partnership operating models might be necessary to ensure greater commercial viability.

The food processing industry will need to play a central role in the country’s nutrition situation because it is the first organized link between farm and shelf.

Private players also have an important role in driving consumer demand for certain types of foods to make back-end infrastructure investments viable. For example, consumer awareness of quality and safety issues of fresh fruits and vegetables or live-cut meat increases demand for frozen and chilled products and hence the need for cold storage infrastructure.

7. Enhance the focus on high-nutrition products

The need for food products with higher nutrition levels is being increasingly recognized as an important solution to India’s micronutrient deficiency. The grains and pulses segment is likely to be essential for lower income groups, as it forms an important constituent in the Indian diet, along with a significant government role in its distribution through the public distribution system. However, challenges exist around the unorganized nature of milling activity that may not have adequate resources for grain fortification as well as commercial unviability because of higher costs.

The success of fortification initiatives will require government and the private sector to develop innovative models that can be implemented on a large scale at low costs. For example, Nepal made flour fortification (with iron, folic acid, and vitamin A) mandatory across the country’s flour mills and worked with the Micronutrient Initiative to develop a low-cost fortification device that can be added to existing flour mills.
Government will also have an important role as the policy maker and monitoring agency. In addition, government can leverage its deep involvement in the food grain value chain to drive better nutritional outcomes. For example, distributing fortified flour or brown rice through the public distribution system could boost demand and provide scale to processing facilities without significantly impacting the government’s subsidy burden. For higher-income groups, the private sector can drive consumer awareness of higher nutrition products to propel demand and improve viability.

India’s success in driving universal salt iodization can also be used as a model. The program’s success factors include the following:

- Legislation mandating universal iodization of salt, equalizing cost impacts for refiners
- Effective central monitoring coalition with regional hubs
- Presence of dedicated government commissioner and department (Salt Department) to champion production, production monitoring, delivery, distribution, and quality control
- Consumer awareness programs targeted at improving grassroots awareness through schools and local health clinics (Anganwadi centers)
- The recent launch of a state-of-the-art web-based management information system for real-time data on quality and quantity of iodized salt

8. Revamp food safety laws focusing on enforcement

India’s food safety challenge is driven by the large share of unorganized processing in areas such as meat, poultry, and milk; the large share of food processing undertaken outside industry (in kitchens and by local street vendors and restaurants); and government’s role through its programs such as midday meal schemes at schools.

Any food safety initiative thus needs to encompass all these areas for effective implementation so that enforcement of the FSSAI act occurs across the food value chain. FSSAI has several planned initiatives, such as establishing one food testing laboratory in every 20 districts in India in the next five years and issuing licenses to about 5.5 crore food business operators across India by February 2014.\footnote{The Food Safety and Standards Authority of India} The focus must be on implementation and innovative solutions, given the vast complexity in the Indian food chain. The processing industry will need to continue improving quality and safety compliance across their suppliers, logistics providers, and retailers. India may want to take a page from Vietnam’s playbook. The two nations are similar in that 80 percent of chickens purchased by Vietnamese shoppers are from wet markets because people believe they are safer. Yet, there is a significant risk of catching avian flu from wet market birds. The country launched a pilot certification program in which select farmers certified their birds as safe, with oversight from professional veterinarians. The result: Shoppers were willing to pay 63 cents more (on average) for “safer” chickens.

9. Implement skill development programs

Several government programs exist for training and skill development across food segments. For example, the Ministry of Food Processing Industries provides assistance for creating training infrastructure at recognized universities, setting up food processing training centers, and monitoring these programs. This would include ensuring the quality of training, the reach of programs, and relevance to the local economy. Output metrics such as gaps in requirement...
areas, including artificial insemination for dairy, should also be tracked to ensure visibility of future focus areas. In addition to academic institutions, partnerships with private players in the food value chain could be useful in improving demand estimation, implementation tracking, and quality of training.

10. Increase awareness of quality and safety

Consumer awareness is of fundamental importance because of food quality and safety challenges as well as the need to shift to more nutritious and better quality foods. While there have been multiple government initiatives aimed at improving consumer awareness in these areas, the results have been limited so far. A private-public partnership can be an effective way to improve awareness, with government linking up with relevant stakeholders in each food chain to disseminate information about food safety and nutrition. A good example is India’s iodized salt program. First launched by the government in 1985, it wasn’t until Hindustan Lever Limited (HLL) launched a massive ongoing advertising campaign in 1995 for its iodized salt that penetration levels rose. Within five years, iodized salt penetration was about 70 percent.

Private players also have a role to play in higher-end food products, offering customers a wider variety of better-quality foods while also improving their awareness of the benefits. Private players must operate under regulatory constraints in developing new, high-quality products, yet generating demand often requires joint efforts by the food processing industry and other stakeholders to influence consumer behavior. For example, protein supplements, a new category for the Indian population, are increasingly being adopted by urban youth thanks to intensive marketing efforts by manufacturers and fitness centers.

11. Develop a Consolidated Policy for Food and Food Processing

The entire food value chain in India is controlled by multiple ministries, departments, and laws. A comprehensive policy will ensure that various initiatives across departments are aligned with the overall goal of ensuring availability, awareness, affordability, access, quality, and safety of food. It will provide action agendas for all stakeholders in the food value chain—government, producers, supply chain partners, food processing companies, and distribution—to focus on prioritized areas. Consider, for example, the integrated national plan to ensure food security adopted by Bangladesh. The country identified 26 areas of intervention to be undertaken in the short-, medium-, and long-term, and defined clear priorities across production, processing, and infrastructure.

In India’s case, there are several possible benefits of a consolidated approach. Bringing together various government subsidies, direct public spending on R&D, and tax revenues on food provides a better balance. For example, observing lower marginal growth from input productivity growth can drive reorientation of subsidies (for example, fertilizer subsidies) to improve factor productivity through investments in R&D or high-yield cultivation techniques. Alternatively, government can redirect subsidies to improve nutrition per gram of food rather than total available quantities of foods through investments in the processing sector. Such a cross-value-chain view would only be feasible under the guidance of a consolidated food and food processing policy.

Government has an important role to play in the non-perishable segment to ensure the sustainability of farmers and the affordability of food. Issues with incentive structures create demand-supply mismatches in some food categories, resulting in excesses for certain food outputs and inadequate production in other areas. A comprehensive national plan will help improve these demand-supply imbalances.
The Way Forward

Ensuring food security for the Indian people requires a concerted effort by all stakeholders, including government and the food processing industry. Several initiatives are required in the sector, with four broad themes forming the basis of an action agenda:

- Leverage greater private-public partnerships in production, extension services, supply chain, and high-nutrition foods.
- Simplify regulations and policies, and ensure stronger implementation in areas of integrated planning, implementation, and standardization.
- Ensure greater transparency in price, volumes, and inventory of food produce.
- Drive innovation and skill development to propel growth over the next decade.

In addition to private players and government, industry bodies and academia also have a crucial role in the success of these initiatives. Industry bodies will need to participate in consultations for policy making and ensuring greater interaction of government and private players to develop private-public partnerships. Universities and other research institutions need to be an integral part of initiatives focused on innovation and capability building.

Effective implementation of these initiatives can ensure that the key targets of availability, affordability, awareness, and quality and safety are met in line with the overall goal of achieving adequate food and nutrition for the entire population of India.

This paper identifies the focus areas for government and the food processing industry. The applicability of various models and initiatives discussed here will need to be assessed across various food chains in India. For example, a detailed business case assessment is required to evaluate the economic feasibility of setting up a cold chain infrastructure by the food processing industry. Further study of these areas will need to be driven by government in consultation with industry stakeholders.
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Established in 1927, the Federation of Indian Chambers of Commerce and Industry (FICCI) is the largest and oldest apex business organization in India. Its history is closely interwoven with India’s struggle for independence, its industrialization, and its emergence as one of the most rapidly growing global economies. FICCI has contributed to this historical process by encouraging debate, articulating the private sector’s views, and influencing policy.

A non-government, not-for-profit organization, FICCI is the voice of India’s business and industry, drawing its membership from the corporate sector, both private and public, including small- and medium-size enterprises and multinational corporations. FICCI enjoys an indirect membership of more than 250,000 companies from various regional chambers of commerce, and provides a platform for sector-specific consensus building and networking and as the first port of call for Indian industry and the international business community.

Our Vision
To be the thought leader for industry, its voice for policy change, and its guardian for effective implementation.

Our Mission
To carry forward our initiatives in support of rapid, inclusive, and sustainable growth that encompasses health, education, livelihood, governance, and skill development.

To enhance the efficiency and global competitiveness of Indian industry and to expand business opportunities both in domestic and foreign markets through a range of specialized services and global linkages.