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India, Factor 8: Spoilage and Waste

India: Infrastructure, Supply Chain affecting Food Waste

Country of India: Located in southern Asia, it is the world's largest economy and the second largest population. India is where 35 percent of the world's poor live with 75 percent of the population living on less than \$2.00 a day. The country exports more than it imports with major crops being rice and wheat. Indian farmers also grow pulses, potatoes, sugarcane, oilseeds, and such non-food items as cotton, tea, coffee, rubber, and jute. They are home to the world's largest dairy population and many fisheries too. Despite having such a large agricultural sector, their crop yields are low compared to other countries. Agriculture accounts for about 25% of the economy and employs about 60% of the labor force.

Typical Farm Family: The average land ownership nationally is about 4 acres, but most small, farm families will own around 2.5 acres of land which is about 1 hectare. Amazingly, small family farms will contribute 50 percent of the agricultural output in India. Like many farmers in the United States, Indian farm families base their lifestyle on beliefs and traditions about living and working. Depending on the region, houses are made of bamboo rods and have dirt floors. India culture has a high regard for sons so 72 percent of couples will continue to have children until at least two sons are born. In many households, it is common for a family to live jointly with several generations. Most often, it will be with the family of the male. Young women expect to live with their husband's relatives after marriage.

Diet: Rural farm families will live off the rice and wheat they produce, but this still leaves the average caloric intake in rural areas at below 2160 calories. In both rural and urban areas, the poor may use a ration card to purchase government subsidized food. This food is picked up at a ration shop as grocery stores are limited, but growing in numbers.

Education: Education in India begins at age six and ends at age 17 with high school. Primary school enrollment has been improving, but 40 percent of students, mostly girls drop out by secondary school. Despite having a 99 percent enrollment rate, attendance rate is much lower. Although, there are child labor laws that prohibit children from working in factories, the law allows them to work in restaurants, family households or in agriculture. Distance to school is a barrier to some children as many have to walk as far as two miles. Many schools are of poor construction without drinking water, toilet facilities or libraries. Single teacher primary schools are common and it is not unusual for the teacher to be absent according to a 1985 report by the Ministry of Education. In, 1995, the schools began providing a mid-day meal which helped encourage children to come. Some schools provide uniforms. If electricity is available, computer-assisted education is used. The interest and curiosity in computers has stirred interest in learning. The national literacy rate is 63 percent. Schools are government run, but fees usually apply to send a child to school. Educating rural children have reduced poverty, controlled disease and enhanced employment opportunities.

Health Care: Primary health centers provide care to rural areas. More difficult cases are referred to urban hospitals. Primary health centers try to cover routine medical care, but there is a shortage of doctors in the city, but especially in the country. The doctor to population ratio is over 1:1900. Women rarely receive prenatal care. Some Indian patients have grown reluctant to seek care as the care received is not always the best. Boys are more likely than girls to receive vaccinations because of the value placed on sons. If a boy is from a family that already has a boy, they are also less likely to receive childhood vaccinations.

Women in Agriculture: Women farmers are beneficial because of their sensitivity and role in providing nutritive food to their family. They are involved in all aspects of the farm from seed selection to planting, harvesting, crop storing and processing. In India, women lack control over land, access to markets, education and political voice. "I can see the strain when I go back to the farms," says Palagummi Sainath. "Women have always done the bulk of work in agriculture, but post-2008, things have changed. There's been a male exodus, and the roles that men were doing in agriculture are now sitting on women's shoulders. People are cracking." The award-winning Sainath, who specializes in rural Indian affairs, says that when legislation called "special economic zones" began men started to leave the countryside for work in these zones. While women have always done a majority of the fieldwork, this has left women performing about 70 percent of the farm work in addition to their regular household duties. Since many women do not own farm ground, they can easily be displaced causing them to walk further for water and sometimes into a community that can be hostile toward them.

A bright spot for women working in agriculture is the government program called Kudumbashree launched in Kerala in 1998. The program now involves close to 4 million women working in more than 47,000 farming collectives. A collective will negotiate a lease to take over unused land.

Farming Practices of Small Farmers: Small farms tend to be more diversified with a variety of crops and livestock which supports sustainability and provides a balanced diet for local consumers. Livestock may include chickens, rabbits, sheep, goats, pigs, cows, buffaloes, donkeys, horses, yaks, llamas, or camels depending on the region. Livestock ownership can be particularly good for women because selling some eggs or milk can create cash quickly when needed. Farming practices are passed from generation to generation. There is an increase in techniques such as farming terraces and adopting zero tillage. Small farms are not likely to purchase commercial inputs and tend to select plants and animals that have desirable traits such as disease resistance and improved yields.

Problems for Small Farmers: It takes about 1 hectare (2.5 acres) for a farming operation to make ends meet according to Rukmini, a writer for The Hindu. Given that 65 percent of farm families have less than 1 hectare means that two-thirds of farm families cannot make ends meet. For these families, they can have a net loss of around 15 U.S. dollars per month. This is resulting in over half the farm households to have debt. The average debt for a farm family is 730 U.S. dollars. Many farm households are relying on non-farm income.

Small farmers typically sell their produce to either a commissioned agent or to a trader. A commissioned agent never takes ownership of the product but will take two and a half to six percent of the value to be the middleman. Because most banks do not give credit to farmers, commissioned agents will often finance the crop. If financed, the seller has only one outlet to sell the crop and takes away bargaining power for a better price. Traders are also buyers of produce who work in remote regions, but there are few traders which limits the potential buyers thus limiting the price.

Infrastructure, Food Waste and Spoilage: While food waste is not unique to the country of India, it is estimated that India has 20-40 percent of the food grown will spoil before reaching the consumer. In many countries like India, poor quality roads, unreliable electricity, insufficient storage and poor logistics cause food loss between farm and market. However, India is unique in that it is one of the largest agricultural output countries in the world so just making a few improvements in waste could impact global food security. Also compared to other countries, farm size in India is very small causing a fragmented industry. With 65 percent of farmers with less than 1 hectare (2.5 acres), they do not have the scale or capital to invest in infrastructure. So far in most regions, small farmers have not been able to organize or work cooperatively to improve supply chain in order to reduce waste.

This is not true in the Punjab region where wheat farmers organized and created some bargaining power to convince the government to invest in irrigation, roads and electricity to improve and transport wheat.

As a result farmers in the Punjab region have seen land values increase and have struggled less. Although, it is not to say that there hasn't been problems in the Punjab Farmers more recently have struggled.

Another success story is private sector exporters. FieldFresh foods has contracted directly with farmers and have educated farmers to ensure consistency and quality. This has raised the local price making it economically justifiable to build cold storage to reduce spoiling.

Private sector and government run supply chains are two of the many methods of distributing food. One of the problems with private sector supply chain as it relates to food wastage is the number of middlemen. Between the farmer and end user, there can be as many as three to four exchanges causing the price to go up each time which pressures price down for the farmer. It also can create time lags resulting in tons of food spoiling. Government run supply chains typically only work with regulated produce especially wheat because it is the government's safety food stock. Fruits and vegetables are generally unregulated. The government will work with commissioned agents or traders buyers to procure product. Since the government doesn't purchase grain on the basis of quality, there is not incentive for farmers to invest in techniques that improve quality and again allowing more spoilage than there should be. The government does operate a Public Distribution System where ration cards can be used to receive subsidized food. However, the government stores the grain for an extended period of time in less than adequate storage facilities. Unexpected rainstorms have caused significant spoilage. The storage facilities have no protection from rodents or pests. There are some government run processors who sell dairy products and canned goods. In some reports, government run programs are known for their inefficiencies, poor reputation and corruption.

Infrastructure such as storage and roads play a major role in the amount of food loss in India. The country ranks 89th out of 142 for infrastructure reliability and adequacy (World Economic Global Competitiveness Report). In 2011, 10 million tons of grain in the public storage system was at risk of rotting due to poor storage. This is enough grain to feed 140 million people for one month. There are few bins or silos and much grain is stored outside under tarps. Bagged grain is stored in jute bags which provide no protection. Building storage bins has been difficult due to finding location and uncertainty of returns on investment.

Building cold storage has been viable for high value products, but the majority of Indian crops are consumed within India which are low value and it has been difficult to pencil a return on investment. In remote parts of India, roads are of poor quality and there is not rail system that is typically a cheaper method of transport. Sometimes, crop prices are so poor, there is no incentive to haul the product to market or even harvest it which means the crop rots in the field.

Recommendations on Infrastructure to Reduce Wastage: Some ways that infrastructure improvements could reduce waste would be to replace the jute bags with a low cost bag that keeps out moisture and pests. Many livestock feeds in the United States are sold in these types of durable weather resistant bags. In remote areas, investments in community storage could be made by local communities, private investors or relief organizations. There would be several benefits in quality storage. Since some grain will be consumed locally, it would improve the quality of the grain thus improving nutrition for both people and livestock. Bringing grain together may allow for bigger trucks to be used when hauling product to market thus improving efficiency. The ability to store grain would also allow farmers to store grain when prices are low and they do not want to sell instead of letting the crop rot in the field.

Food Preservation, Food Waste and Spoilage: In some countries, further processing of fruits and vegetables run from 65-83 percent where in India, it runs 2 percent. India wastes more fruits and vegetables than it consumes. It is estimated that about 30 percent of this loss could be reduced if refrigerated trucks were used. There is also some loss due to handling of product and poor roads which causes unnecessary jouncing of fresh produce.

Lack of refrigerated trucking is a problem for dairy too. Recently, a group of young entrepreneurs of the start-up enterprise “promethean power systems” tried to solve this problem by developing a new thermal battery, which led to the creation of a “rapid milk chiller” (RMC). The RMC is now being deployed in some agricultural areas. It uses a thermal energy battery pack that charges on solar power and, when available, on grid electricity. The loaded battery provides cold storage around the clock regardless of unreliable access to electricity. The Rapid Milk Chiller can thus close the cold-chain from the small producers to the dairy. Icelings is a company that developed a solar-powered refrigeration system for transporting fruits and vegetables from rural farms to city markets. It is adaptable to many parts of India where electricity is not needed.

Recommendations on Food Preservation to Reduce Wastage: With only two percent of India’s food being further processed. There should be opportunity to increase food processing enterprises. The ability to store food again allows a farmer to hold product until price goes up. If electricity is available and capital investments were made, some food processing companies may be started in the rural areas where the food is produced so fresh produce does not need to be hauled, but also to provide jobs for those living in those regions. Having non-farm jobs available locally may keep some spouses and family members near their farming family members thus keeping support systems in-tact.

In some regions, the best opportunity to get produce to market is to improve roads. This seems most appropriate for the government to invest into roads as the benefits should go beyond agriculture. Improved roads would give those in rural areas access to health care. As evidenced in Punjab, once roads were improved, land values increased and the economy improved.

Policies that May Negatively Affect Food Waste: Credit to small farmers is certainly a disadvantage and inhibits land ownership. Land ownership would benefit small, rural communities by having those who work the land, own the land. This would keep farmers on the land and in the community. Small farmers tend to be diversified in their crops and livestock which provides a balanced diet to locals. Providing credit without predatory practices would be beneficial to agriculture. Some Indian laws put larger companies at a disadvantage. For example, large companies are prohibited in binding contracts with farmers making it difficult for long range planning and investing in infrastructure. Historically, Indian laws have not been favorable toward foreign investors. Corruption within the supply chain is disturbing considering the number of malnourished Indians. Corruption should be addressed by authorities.

International relief groups always have an interest in feeding and educating children. Many U.S. agricultural companies share this view. Alliances could be made where, for example, a bin company begins manufacturing grain storage in India for rural villages and relief aid workers provide some of the funds and labor to put them up.

While improvements can be seen in India’s agriculture, there are many hungry groups of people. Nourished people will have better health and an improved chance of getting an education and working. Organizations like Feed My Starving Children, Oxfam and World Vision will always be needed to provide nourishment to the most needy.

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