

Food systems

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The term "**food system**" is used frequently in discussions about nutrition, food, health, community economic development and agriculture. A food system includes all processes and infrastructure involved in feeding a population: growing, harvesting, processing, packaging, transporting, marketing, consumption, and disposal of food and food-related items. It also includes the inputs needed and outputs generated at each of these steps. A food system operates within and is influenced by social, political, economic and environmental contexts. It also requires human resources that provide labor, research and education. Food systems are either conventional or alternative according to their model of food lifespan from origin to plate.^{[1][2][3]}

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Conventional food systems

Conventional food systems operate on the economies of scale. These food systems are geared towards a production model that requires maximizing efficiency in order to lower consumer costs and increase overall production, and they utilize economic models such as vertical integration, economic specialization, and global trade.

The term “conventional” when describing food systems is large part due to comparisons made to it by proponents of other food systems, collectively known as alternative food systems.

History of conventional food systems

The development of food systems can be traced back to the origins of in-situ agriculture and the production of food surpluses. These surpluses enabled the development of settled areas and contributed to the development of ancient civilizations, particularly those in the Fertile Crescent.^[4] The system of trade associated with the exchange of foodstuffs also emerged in East Asia, North America, South America, and Sub-Saharan Africa with common commodities of exchange such as salt, spices, fish, grains, etc.^[5] Through events in world history such as the conquests of Alexander the Great, the Crusades, the expansion of Islam, the journeys of Marco Polo, and the exploration and colonization of the Americas by Europeans led to the introduction and redistribution of new foods to the world at large, and food systems began to intermingle on a global scale. After World War II, the advent of industrialized agriculture and more robust global trade mechanisms have evolved into the models of food production, presentation, delivery, and disposal that characterizes conventional food systems today.^[6]

Impacts of conventional food systems

Lower food costs and greater food variety can be directly attributed to the evolution of conventional food systems. Agronomic efficiency is driven by the necessity to constantly lower production expenses, and those savings can then be passed on to the consumer. Also, the advent of industrial agriculture and the infrastructure built around conventional food systems has enabled the world population to expand beyond the “Malthusian catastrophe” limitations.

However, conventional food systems are largely based on the availability of inexpensive fossil fuels, which is necessary for mechanized agriculture, the manufacture or collection of chemical fertilizers, the processing of food products, and the packaging of the foods. Food processing began when the number of consumers started growing rapidly. The demand for cheap and efficient calories climbed resulting in nutrition decline.^[7] Industrialized agriculture, due to its reliance on economies of scale to reduce production costs, often leads to the compromising of local, regional, or even global ecosystems through fertilizer runoff, nonpoint source pollution,^[8] and greenhouse gas emission. Also, the need to reduce production costs in an increasingly global market can cause production of foods to be moved to areas where economic costs (labor, taxes, etc.) are lower or environmental regulations are more lax, which are usually further from consumer markets. For example, the majority of salmon sold in the United States is raised off the coast of Chile, due in large part to less stringent Chilean standards regarding fish feed and regardless of the fact that salmon are not indigenous in Chilean coastal waters.^[9] The globalization of food production can result in the loss of traditional food systems in less developed countries, and have negative impacts on the population health, ecosystems, and cultures in those countries.^[10]

Alternative food systems

Alternative food systems are those that fall outside the scope of conventional agriculture.

Local food systems

Local food systems are networks of food production and consumption that aim to be geographically and economically accessible and direct. They contrast to industrial food systems by operating with reduced food transportation and more direct marketing, leading to fewer people between the farmer and the consumer. As a result, relationships that are developed in local food systems emerge from face-to-face interactions, potentially leading to a stronger sense of trust and social connectedness between actors.^[11] As a result, some scholars suggest that local food systems are a good way to revitalize a community.^[12] The decreased distance of food transportation has also been promoted for its environmental benefits.^[13]

Both proponents and critics of local food systems warn that they can lead to narrow inward-looking attitudes or ‘local food patriotism’,^[14] and that price premiums and local food cultures can be elitist and exclusive.^[15]

Examples of local food systems include community-supported agriculture, farmers markets and farm to school programs. They have been associated with the 100 Mile Diet and Low Carbon Diet, as well as the food sovereignty movement and slow food movement. Various forms of urban agriculture locate food production in densely populated areas not traditionally associated with farming. Garden sharing, where urban and suburban homeowners offer land access to food growers in exchange for a share of the harvest, is a relatively new trend, at the extreme end of direct local food production.

Organic food systems

Organic food systems are characterized by a reduced dependence on chemical inputs and an increased concern for transparency and information. Organic produce is grown without the chemical pesticides and fertilizers of industrial food systems, and livestock is reared without the use of antibiotics or growth hormones. The reduced inputs of organic agriculture can also lead to a greater reliance on local knowledge, creating a stronger knowledge community amongst farmers.^{[16][17]} The transparency of food information is vital for organic food systems as a means through which consumers are able to identify organic food.^[18] As a result, a variety of certification bodies have emerged in organic food systems that set the standards for organic identification. Organic agriculture is promoted for the ecological benefits of reduced chemical application, the health benefits of lower chemical consumption, the economic benefits that accrue to farmers through a price premium, and the social benefits of increased transparency in the food system.

Like local food systems, organic food systems have been criticized for being elitist and inaccessible. Critics have also suggested that organic agriculture has been conventionalized such that it mimics industrial food systems while using pesticides and fertilizers that are organically derived.^[19]

Cooperatives in food systems

Cooperatives can exist both at the farmer end of food production and the consumer end. Farming cooperatives refer to arrangements where farmers pool resources, either to cultivate their crops or get their crops to market. Consumer cooperatives often refer to food cooperatives where members buy a share in the store. Co-operative grocery stores, unlike corporate grocery stores, are socially owned and thus surpluses cannot be taken from the store as profit. As a result, food co-ops do not work for profit, potentially keeping prices more cost representative. Other forms of cooperatives that have developed more recently include community-supported agriculture, where community members buy a share in a farm’s harvest, and may also be engaged in farm labour, operating at both the consumer and producer end of food systems. Garden sharing pairs individual landowners and food growers, while variations on this approach organize groups of food gardeners for mutual assistance.

The benefits of cooperatives are largely in the redistribution of risk and responsibility. For farming cooperatives that share resources, the burden of investment is disbursed to all members, rather than being concentrated in a single individual. A criticism of cooperatives is that reduced competition can reduce efficiency.^[20]

Alternative Food for Global Catastrophic Risk

A global catastrophic risk is a hypothetical future event with the potential to inflict serious damage to human well-being on a global scale.^[21] Some such events could destroy or cripple modern civilization. These global catastrophes include: super volcanic eruption, asteroid or comet impact, nuclear winter, abrupt climate change, super weed, super crop pathogen, super bacterium, or super crop pest. Mass human starvation is currently likely if global agricultural production is dramatically reduced for several years following any such event.^[22] Engineers, David Denkenberger and Joshua Pearce argue in *Feeding Everyone No Matter What* that humanity could be fed in such situations by converting natural gas and wood fiber to human edible food using known pathways.^[22] Potential pathways include growing mushrooms on wood and then eating the mushrooms directly as well as feeding the waste to ruminates and then eating them.^[23]

Fair Trade

Fair trade has emerged in global food systems to create a greater balance between the price of food and the cost of producing it. It is defined largely by more direct trading systems whereby producers have greater control over the conditions of trade and garner a greater fraction of the sale price. The main goal of Fair Trade is to “change international commercial relations in such a way that disadvantaged producers can increase their control over their own future, have a fair and just return for their work, continuity of income and decent working and living conditions through sustainable development”^[24] Like organic food systems, fair trade relies on transparency and the flow of information.^[25] Well-known examples of fair trade commodities are coffee and cocoa.

Transparency

Transparency within food systems refers to full disclosure of information about rules, procedures and practices at all levels within a food production and supply chain.^[26] Transparency ensures that consumers have detailed information about production of a given food item. Traceability, by contrast, is the ability to trace to their origins all components in a food production and marketing chain, whether processed or unprocessed (e.g., meat, vegetables) foods.² Concerns about transparency and traceability have been heightened with food safety scares such as Bovine Spongiform Encephalopathy (BSE) and Escherichia coli (E. coli), but do not exclusively refer to food safety. Transparency is also important in identifying foods that possess extrinsic qualities that do not affect the nature of the food per se, but affect its production, such as animal welfare, social justice issues and environmental concerns.^[27]

One of the primary ways transparency is achieved is through certification and/or use of food labels. In the United States, some certification originates in the public sector, such as the United States Department of Agriculture (USDA) Organic label. Others have their origin in private sector certification (e.g., Humanely Raised, Certified Humane). There are also labels which do not rely on certification, such as the USDA’s Country of Origin Label (COOL).

Participation in local food systems such as Community Supported Agriculture (CSA), Farmers Markets, food cooperatives and farmer cooperatives also enhances transparency, and there are diverse programs promoting purchase of locally grown and marketed foods.

Labeling



USDA Organic Label

Organic (USA) - The USDA Organic label indicates that the product has been produced in accordance with the USDA's Federal Organic Standard. This label is applied to fruits, vegetables, meat, eggs and dairy products. Some states, such as California, have their own organic label. Organic labelling is prominent internationally as well.



Fair Trade Show in UK

Fair Trade -Indicates that the product has been grown and marketed in accordance with Fair Trade standards. This is an independent certification, awarded by FLO-CERT and overseen by FLO International. Major food items that are marketed under Fair Trade are coffee, tea and chocolate. Many items other than food are sold with a Fair Trade label.

Food Alliance Certified. Food Alliance is a nonprofit organization that certifies farms, ranches, and food processors and distributors for safe and fair working conditions, humane treatment of animals, and good environmental stewardship. Food Alliance Certified products come from farms, ranches and food processors that have met meaningful standards for social and environmental responsibility, as determined through an independent third-party audit. Food Alliance does not certify genetically modified crops or livestock. Meat or dairy products come from animals that are not treated with antibiotics or growth hormones. Food Alliance Certified foods never contain artificial colors, flavors, or preservatives. Food Alliance Certified. <http://www.foodalliance.org>



Examples of COOL Labeling

Country of Origin - This label was created by enactment of the 2002 Farm Bill. The US Department of Agriculture is responsible for its implementation, which began 30 September 2008. The bill mandates country of origin labeling for several products, including beef, lamb, pork, fish, chicken, perishable agricultural commodities and some nuts. USDA rules provide specifics as to documentation, timetables and definitions.^[28] There is not one specific label to indicate the country of origin; they will vary by country.

American Humane Certified. This certification is provided by the American Humane Association, and ensures that farm animals are raised according to welfare standards that provide for adequate housing, feed, healthcare and behavior expression. Antibiotics are not used except for therapeutic reasons; growth promoters are not used. Other issues including transport, processing and biosecurity are addressed as well. Species covered are poultry, cattle and swine.^[29]

Certified Humane Raised & Handled. This label ensures that production meets the Humane Farm Animal Care Program standards, which addresses housing, diet (excluding routine use of hormones or antibiotics) and natural behavior. Additionally, producers must comply with food safety and environmental protection regulations. They must meet standards set by the American Meat Institute, that are more stringent than those laid out in the Federal Humane Slaughter Act. Certification has been applied to beef, poultry and eggs, pork, lamb, goat, turkey, veal, dairy products and wool.^[30]

See also

- Agricultural value chain
- Agroecology
- Aquaculture
- Animal Welfare
- Factory Farming
- Fair Trade
- Fair Trade Certification
- Food distribution
- Food Safety
- Food chain
- Food industry
- Johns Hopkins Center for a Livable Future
- Industrial agriculture
- Local food
- Organic certification
- Organic Food
- Organic Farming
- National Animal Identification System
- Sustainable Agriculture
- Traceability

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29. American Humane Association. <http://www.americanhumane.org/>
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External links

- The American Humane Association: <http://www.americanhumane.org/>
- Protected Harvest sustainability certification: <http://www.protectedharvest.org/>
- Humane Farm Animal Care: <http://www.certifiedhumane.com>
- Univ. of Wisconsin - Agroecology: <http://www.agroecology.wisc.edu/>
- UC Santa Cruz Center for Agroecology & Sustainable Food Systems - <http://casfs.ucsc.edu/index.html>
- "Bacon as a Weapon of Mass Destruction" (http://www.democracynow.org/2009/8/3/aron_gupta_on_bacon_as_a) - video by *Democracy Now!*
- Food for the Cities initiative (<http://www.fao.org/fcit>) of the Food and Agriculture Organization of the United Nations (FAO) (<http://www.fao.org>)

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