

Food donation: An initiative to mitigate hunger in the world

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Introduction

Each year about 1.3 billion tons of food are wasted and at the same time about 800 million people do not have access to sufficient and nutritious food (Global FoodBanking Network, 2014b). This figure represents roughly one third of food produced for human consumption. Food can be either *lost* or *wasted* throughout the supply chain, from initial agricultural production down to final household consumption (FAO, 2011). The difference between losses and waste lies in the supply chain stage where food is no longer usable for human consumption. Loss occurs when food does not reach the final consumer due to improper handling, packing and storage. Such foods are not suitable for human consumption and only have a marginal value to be transformed as low cost fertilizers and fuel. Waste occurs when the product that reached the final marketplace is not consumed due to improper consumer behavior, bad storage practices as well as to the lack of coordination between different stakeholders in the supply chain.

In many cases, fresh products are rejected by large supermarket chains if they do not meet certain quality standards such as shape, size and appearance, regardless of their suitability for human consumption. In addition, many retail chains discard products before their expiring dates claiming that the products either are unsellable or generate negative image to the retailer. Consumer's attitudes and the consumption culture also play their part as they reject food that is in good condition but with "not-so-good" appearance. Foods that have reached households are also wasted because they turn unsuitable for human consumption. Restaurants and hotels are other stakeholders within the food waste, because of the large portions served to customers. Since not all the portion is consumed, the rest will end up in the garbage bin.

The role of the local governments in setting up and running food banks is controversial. On one hand, food banks are seen as a failure of the society for providing food to those in need. As such, food banks sponsored or run by local governments are considered as a multi-millionaire business of poverty perpetuation funded by taxpayers (Belger, 2014). This is the case in the UK, where local authorities are preparing to invest in charity-run food banks to cope with an expected flood in demand for crisis help from low income families hit by welfare cuts (The Guardian, 2014). Food banks there are usually run by charities or churches and not directly by the government. This initiative did not find many adepts as it could be inferred by the letters from the newspaper readers.

It is difficult to say whether or not the local governments should run food banks. However, the role of the local authorities cannot be neglected. Local authorities must support the operation of food banks by creating conditions such as tax deductions, food donation from local city or state-run markets and in cases as in Bogotá help distribute foods to the “comedores comunitarios” (community dining tables) which are a kind of soup kitchens.



Latin American countries suffer from precarious farming and harvesting conditions, poor infrastructure related to storage facilities and a careless attitude of high income consumers, especially in retailers. In Colombia, according to the National Survey on Nutrition Facts (ENSIN in Spanish), approximately 42% of Colombians suffer from malnutrition due to their low income, do not have all three meals and do not consume enough calories to perform simple daily tasks. In urban areas, about 38% of the households live in a similar situation and only in Bogotá, 27% of the population lives in a situation of food insecurity. In 2007, the city mayor inaugurated the “Bogotá without hunger” program with several goals that included the reduction of fresh food prices through the elimination of intermediation and the provision of foods for schoolchildren.

In addition, roughly 1.15 million tons of fruits and 261,000 tons of vegetables per year are lost in post-harvest processes and they never reach the final consumer (Hurtado, 2013). The concern of different groups led to create a network of food banks and other similar organizations that have recovered in Colombia about 100,000 tons of food in five years. However, this amount is negligible in comparison with the waste estimated in about 1,200 tons per day. Part of this wasted food category can be eligible for human consumption, but it is discarded because of the lack of standardization, traceability and agile reverse chains.

Several strategies have been proposed to mitigate the problem of food loss and waste. Beyond the obvious improvements on the supply chain to reduce losses and changes in the consumer behavior to reduce waste, alternatives such as energy generation through Urban Solid Waste (USW), “waste-to-energy” and Advanced Thermal Treatments (ATT) that require the usage of energy to produce energy, have been criticized because they do not address the roots of the problem (“No a la Incineración”, 2011). Other alternatives such as composting are feasible but do not figure the the problem out; since it does not make sense to plant, harvest, inspect, pack, and distribute foods to use them as composting materials.

The concept is food that is not composted or used as a source of energy but used for the original purpose for which it was produced, i.e. human consumption. This is food that is still suitable for human consumption due to minor defects, general overproduction, low market prices, or poor management of food in households and in shops in numerous countries. Some authors state that food waste is a result of our loss of respect towards food (Schneider, 2013).



A more plausible alternative is food donation. The idea is simple: Organizations which discard food in acceptable condition, offer such food to individuals in need or organizations which can use the food to help others. This food can be either donated or sold at considerable lower prices.

A common issue for food banks around the globe is that they have to struggle on convincing potential donors such as farmers, manufacturers and retailers to donate food. This problem arises mainly in certain countries such as Colombia, where donating food is more expensive than destroying it (Hurtado, 2013). Another important problem that food banks have to face is

malnutrition, therefore, besides trying to acquire the proper amount and kind of food to instill good eating habits and teach good practices for storing and for preparing food.

In certain cases, food banks have to purchase food according to their needs, because sometimes they have problems getting enough and the right kind of food. In addition, in some cases the lack of the proper tools, equipment and infrastructure affect the response capacity according to the offer-demand of donations and it limits the number of potential beneficiaries that can be attended. Therefore, food banks in certain countries of the world have to struggle with obtaining support from public or private entities for acquiring the proper software, equipment and infrastructure required for improving the donations handling and management process.

However, there are a number of issues related to food donation as pointed out in the literature (Schneider, 2013). These issues are:

(i) Distribution: Donated foods must reach primarily those in need. Therefore a good visibility/traceability system must be implemented to guarantee that this is achieved. In some countries, corruption leads to cases where donated food is used for feeding animals or for composting. Membership cards issued by local authorities are commonly used and work out well in most of the cases. On the other hand, a recent study (Zhu, Early, & Himmelheber, 2014) showed that in a sample of food pantries in the United States, roughly 17% of the food had low nutrition content and 16% was unusable for human consumption. The same study showed that many of such pantries had poor facilities in terms of storage, preparation and delivery of food. Such facilities heavily rely on donated foods. Another study (Verpy, Smith, & Reicks, 2003) concluded that food donations did not match client needs for people with different ethnic backgrounds or age groups and food safety concerns. Such a study may be against the common belief that recipients must accept all donated foods regardless of their cultures, customs and quality.

(ii) Stigmatization: People who take donated food are often considered second class citizens. In many cases, people refuse to accept donated foods (even for free), because this can be considered as symbol of poverty (Scherhauser & Schneider, 2011a).

(iii) Supply and demand: The supply of donated products such as bread exceeds its demand as pointed out by (Scherhauser & Schneider, 2011b) and such excess is thrown away. In other cases, the collection of food becomes too difficult and demands lots of effort. Another problem is the conflict between food recipients who need donated food early in the supply chain and the interest of retailers who make more profits as food progresses on the supply chain (Alexander & Smaje, 2008).

(iv) Costs and Regulations: In some countries, donating food is more expensive than destroying it. For example, in Colombia, donor must pay 16% VAT (Hurtado, 2013). In other countries such as the United States, donors may face legal actions if their donations later cause harm which is very difficult to control (Schneider, 2013).

This paper deals with products which can be recovered from the system before they are completely disposed. A more detailed account on food donation will be offered throughout the text. The paper is organized as follows: The first section presents relevant historical remarks and specific country cases of food banks. The second section describes their more salient issues. The third section deals

with food donation best practices. Lastly, an account of food banks from the perspective of biological sciences is deployed.

History and role of food banks in the world

As said above, each year billions of tons of food are wasted (Global FoodBanking Network, 2014b). Considering this problem in 1967, in Phoenix, USA, John Van Engel created the first Food Bank. (FoodBanks Association in Colombia, 2014a).

These non-profit organizations have contributed to reduce hunger and malnutrition in regions with vulnerable population, through food donation. In this sense, the food still suitable for human consumption that was allocated to be wasted, is recovered and distributed to organizations or foundations to help people (Foundation FoodBanks Network in Argentina, 2009).

The food banks are composed by store networks, transportation systems, distribution centers, volunteers, agencies and organizations that serve as source of support to the people in need. Caregivers from all sectors of the community are involved and become a vehicle for building public awareness about hunger and its solutions, as well as a powerful voice to conduct the political decisions that enhance food security for individuals and for communities (Los Angeles Regional FoodBank, 2014).





Figure 1. How does a Food Bank work? Source: Los Angeles Regional Food Bank, (2014)

Besides the structure in food banks and the staff required, the logistics of a food bank has kept basic: donor advised of his/her intention to donate products to the food bank reaching an agreement with the donor on how the products will be delivered and the benefits that the donor will have (tax exemption). The process to receive goods is performed on the distribution center of the bank where the products will be stored on pallets and later they must go through a classification stage, where products which are unfit for human consumption are discarded. Finally the packaging process is performed. If it is necessary, the storage process can be added (Pipino & Marino, 2012). Once this process is completed, the administrative area of the bank shall inform the foundations of the products available to purchase these products worth about paying 10% - 15% of the actual value product on the market (BAMEX, 2013). In the Figure 2 can be seen a summary of the process.

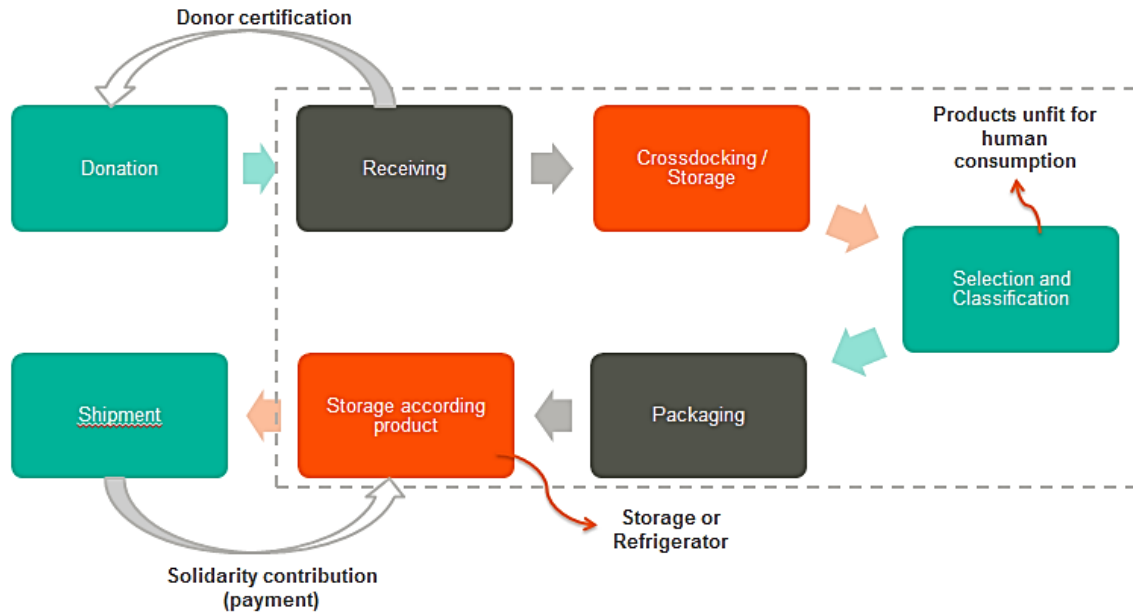


Figure 2. Logistics in a Food Bank. Source: Food Banks Association in Argentina, (2009)

These foundations usually receive food with the following characteristics (Mills, Andrews, & WRAP ROTATE, 2009) :

- Defects on the good presentation.
- Short expiration date.
- Goods with low turnover.
- Goods whose maturation state requires a prompt consumption.

Currently there are over 500 food banks in the world, serving more than 20 million people. These food banks are connected by the Global Network of Food Banks (GFN) currently comprised by Argentina, Canada, Mexico, United States, United Kingdom, Japan, South Africa, Australia, Guatemala, Colombia, Brazil, Bulgaria, Chile, Costa Rica, Ecuador, Egypt, El Salvador, France, Honduras, Hong Kong, India, Israel, Namibia, Nicaragua, Nigeria, Paraguay, Russia, Sierra Leone, Singapore, South Korea, Taiwan, Turkey and Uruguay (Global FoodBanking Network, 2013).

This network is dedicated to help existing food bank systems, broaden their operations, increase impact, and deliver food to more hungry people. In order to accomplish these goals, the Global Food Network (GFN) establishes and maintains strong partnerships with the global grocery products industry, the broader NGO community, global philanthropic resources, and other institutions focused on reducing hunger and improving nutrition. Additionally GFN is involved in a number of projects aimed to create food banks where they do not exist. GFN participates in New Food Bank Creation projects in 3 different ways: working as the primary initiator, working with an in-country champion, and working alongside another NGO in order to build new food banks (Global Food Banking Network, 2014c).

In the Table 1, it some activities developing in the Food Banks around the Globe can be seen.

Table 1. Food Banks Activities

COUNTRY	IMPACTS	DONORS
South Korea	It is the bigger food bank in Asia. They use the model of the Salvation Army Food Market where vulnerable population can "buy" food, clothes, cleaning products like in a convenience store. People can take only 5 products per month. Currently, it serves on average to 1,700 clients on the food banks and 650 clients on the markets (Second Harvest Asia, 2012).	600 corporations of food industry and 400 aid organizations
India	It adopted an integrated development approach to include initiatives on malnutrition, water, sanitation and hygiene to develop training skills to break the cycle of poverty. A food bank (as a distribution enterprise) can offer a wide range of ancillary programmes to its beneficiaries depending on the socio-economic structure of the communities and their needs. It can help to launch services to fulfill particular needs of the community such as disaster response, clothing distribution, etc. As the food bank has a significant presence in the community, it can be used as model to scale such programs through NGOs partners to provide better reach, ease of implementation and resource development for the community's needs (Indian Food Banking Network, 2014).	Government, private sector and NGO's
Spain	There are 50 Food Banks in Spain, all of them members of the Spanish Food Banks Federation. The food bank is organized having transport, warehouse, distribution, accounting, procurement, communication and management. The bank receive donations from companies that are willing to give (free of charge) surpluses that would otherwise be destroyed. The bank only gives donations to aid organizations (FESBAL, 2013).	Private sector and population
Russia	It develops activities of collection and distribution of food, personal hygiene products, household chemicals and other essential goods on a charitable basis to socially insecure categories of population in 88 regions of Russia, helping more than 150 non-profit organizations, social services and parishes of the Russian Orthodox Church. Russian Food Bank is the first virtual food bank that works like a hub with constant activity. All of the agencies have been pre-approved and must conformed to very rigid inspections, reporting, monitoring, and inventory protocols. (Food Bank Rus, 2014)(Global FoodBanking Network, 2014a).	Largest manufacturers, retailers, trucking companies and other services companies.
South Africa	Although South Africa produces enough food to feed its entire population, many people cannot access this food because of the high cost. This fact makes that one third of the food is going to landfill, resulting in a very negative impact on the environment by producing the climate-changing greenhouse gas – methane and wasting food in good conditions. In order to rescue that product and to give it to the vulnerable population, different programs of food rescue, food procurement, community nutrition and development center have been developed. Other programs are on the line to promote self-sustainability in the 600 organizations that they help. Food Bank SA rescues more than 4,390 tons of food annually (Food Bank SA, 2014)	Manufacturers and Retailers

Nigeria	Food bank Nigeria is a nonprofit and non-religious organization which collects food items from different sources. It stores, repackages and redistributes the food among the different agencies and organizations that run feeding efforts across the nation to deal with hunger, food insecurity and poverty in Nigeria. Food bank Nigeria develops activities of research, food sourcing, fund raising, emergency relief and agency management (The Nation, 2014).	Food manufacturers, wholesalers and retailers
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Table 1. Food Banks Activities (Cont.)

COUNTRY	IMPACTS	DONORS
Australia	This food bank collects products that are out of specification, close to expiration dates, with incorrect labeling or damaged packaging, as well as excessive stock and deleted lines. With these efforts, the companies reduce transport and tipping costs, avoid waste and reduce the production of the greenhouse gas methane. Given the long distances between Australian populations, the network has also designed a model of mobile food bank, carrying food into smaller vehicles directly to the vulnerable population. Donations of food do not always meet demand, so the food bank partners subsidizes the goods or the services to produce, to process, to package and to transport essential items (Food Bank Australia, 2014)	Farmers, manufacturers and retailers.
USA	It is directed by the Feeding America program, which is the leading charitable organization of the country in food aid. Its mission is to feed hungry Americans through a national network of food banks and to engage the USA in the fight against hunger. Actually they have 200 food banks. The Feeding America nationwide network of food banks secures and distributes more the 3 billion meals each year to communities throughout USA. They feed 46.5 million people at risk of hunger, including 12 million children and seven million seniors (Feeding America, 2014)	Farmers, manufacturers and retailers.
Canada	Today, there are more than 800 food banks and 3,000 food programs in Canada. Most of the people are aware that food banks offer food assistance. Other services offered by the food banks are: sharing hampers of food and personal care products, preparing and serving meals from soup kitchens, operating snack programs, providing post-secondary campus food programs, running community kitchens, organizing community gardens. In fact, close to 40% of food banks are run solely by volunteers (Food Banks Canada, 2013)	Corporate sponsors, individual donations, community support, parent organizations
Chile	The Food Bank Network of Chile began its operation in 2010 with the mission to receive, to manage and to distribute food to social organizations in the metropolitan area for free. In addition to the free distribution, the food bank receive donations for around 1% of products (equivalent to 120,000 tons of food) from different companies. The food bank has delivered 20 million food rations (7,000 tons) to 124 solidarity organizations, reaching more than 52,000 vulnerable people (Sociedad Anónima, 2013)	Manufacturers and Retailers

Mexico	The network is composed by 61 food banks. It manages policies in national conventions. It has established food donation management and exchanges among other banks. It develops special projects, advises and trains operational staff, among other activities. Socio-economic studies are developed to understand who really needs the help in order to drive the food to those in the most vulnerable situation. The food is delivered in a weekly basis always trying to be balanced with the product available: fruits, vegetables, grains, groceries, cereal, protein, etc. The food bank asks to the recipient a salvage value that according to the law should not exceed 10% of the market value. This fact makes it possible for banks to be self-sustainable. In 2013, they rescued more than 55,000 tons of food benefiting more than 1 million of Mexicans (BAMEX, 2013)	Major agricultural, manufacturing and retail companies
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Each of these networks of food banks has been an example for the development of the various food banks in the world, in Figure 3 it can be seen the summary of the story for different food banks.

Particularly, the Food Bank Association of Colombia (ABACO) was founded in 2009 with the purpose of representing food banks deployed in different cities of the country and generating strategic alliances with the private and public sector (FoodBanks Association in Colombia, 2014b). Since then, several food, retail and beverage manufacturing companies have been supporting local food banks with food, funds, volunteers and intellectual capital donations. In 2012 3,000 tons of food were rescued, helping 214,000 persons with scarce resources abroad the country. This fact was done thanks to the intervention of the local food banks and the support of 640 companies which donated products that did not have the expected rotation or that were closed to be expiration dates (FoodBanks Association in Colombia, 2014c).



There are certain examples of donations and support provided by certain companies that are worth to be mentioned. For instance, recently the dairy company Alquería donated one million glasses of milk, which is being delivered to and distributed from food banks in Bogotá, Medellín, Cali, and Bucaramanga to all members of ABACO (Global Food Banking Network, 2014d). One of the food banks located in Medellín, Fundación SACIAR, has received in the last years, financial support and donations of products manufactured by Griffith Colombia, helping about 38,000 people in need in the country. Griffith Colombia's research and development team has helped SACIAR in the development of a powdered nutritional supplement that is used to nourish hungry people, especially children from one to six years-old. In addition, Griffith donates raw material and processes the product at their own plant in Colombia (Global Food Banking Network, 2014e).

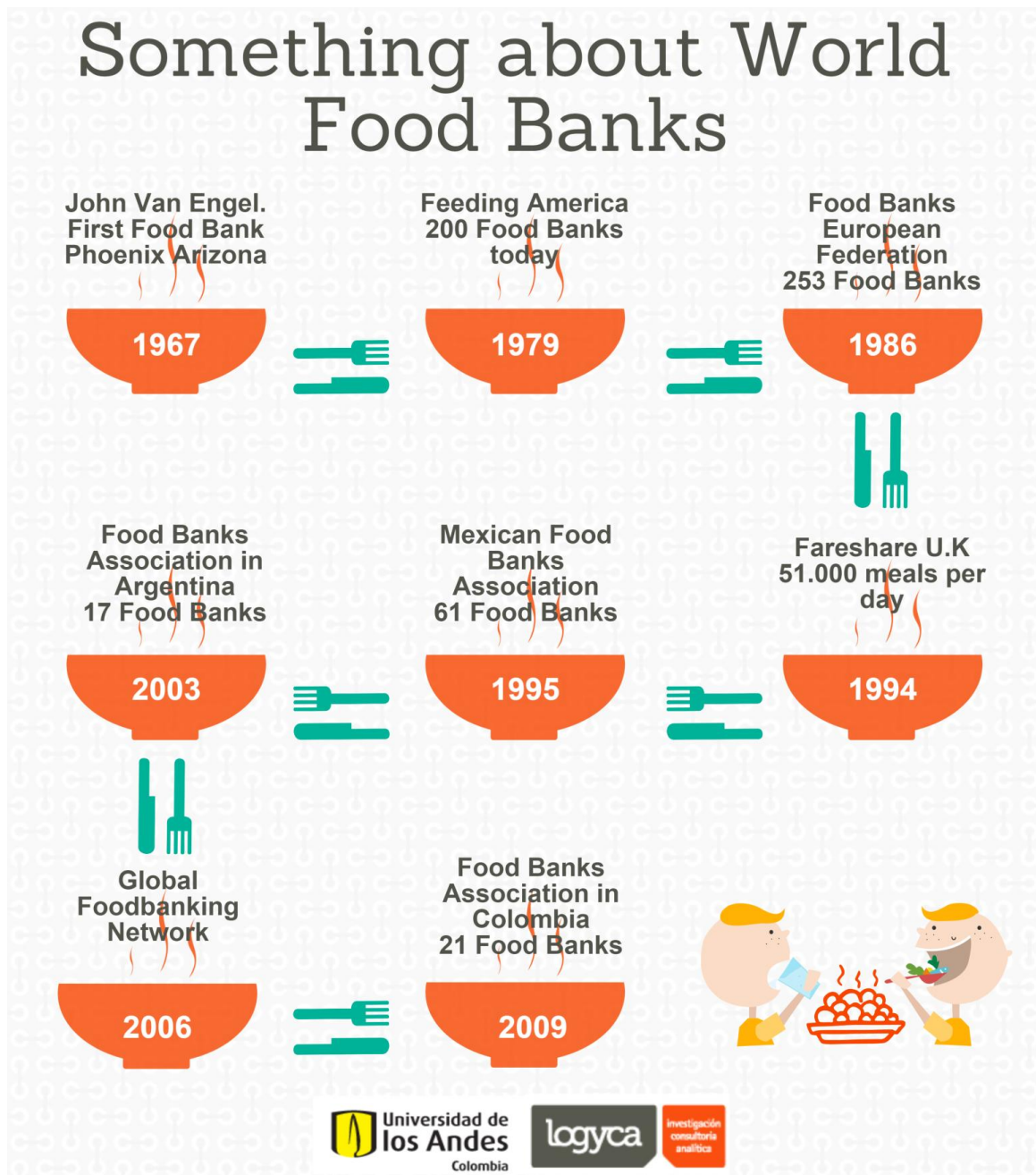


Figure 3. Food Banks throughout the world

Best practices on food banks and recommendations

One of the main reasons to lose potential food donations is the inefficient handling. In this section we review some of the best practices to increase the use of products suitable for human consumption. Products for potential donation are returns made by customers or retailers to suppliers. Even though these products finished their commercial lifecycle (they are no longer

attractive for sale), they are still suitable for human consumption. Most of these products are not handled and identified properly in storage and transport operations, since they are affected by environmental factors such as temperature and humidity. These factors generate loss of the cold chain, cross contamination, return shipping delays. To execute properly the return process and recover the maximum quantities of products for donation the next principles (Figure 4) are suggested:

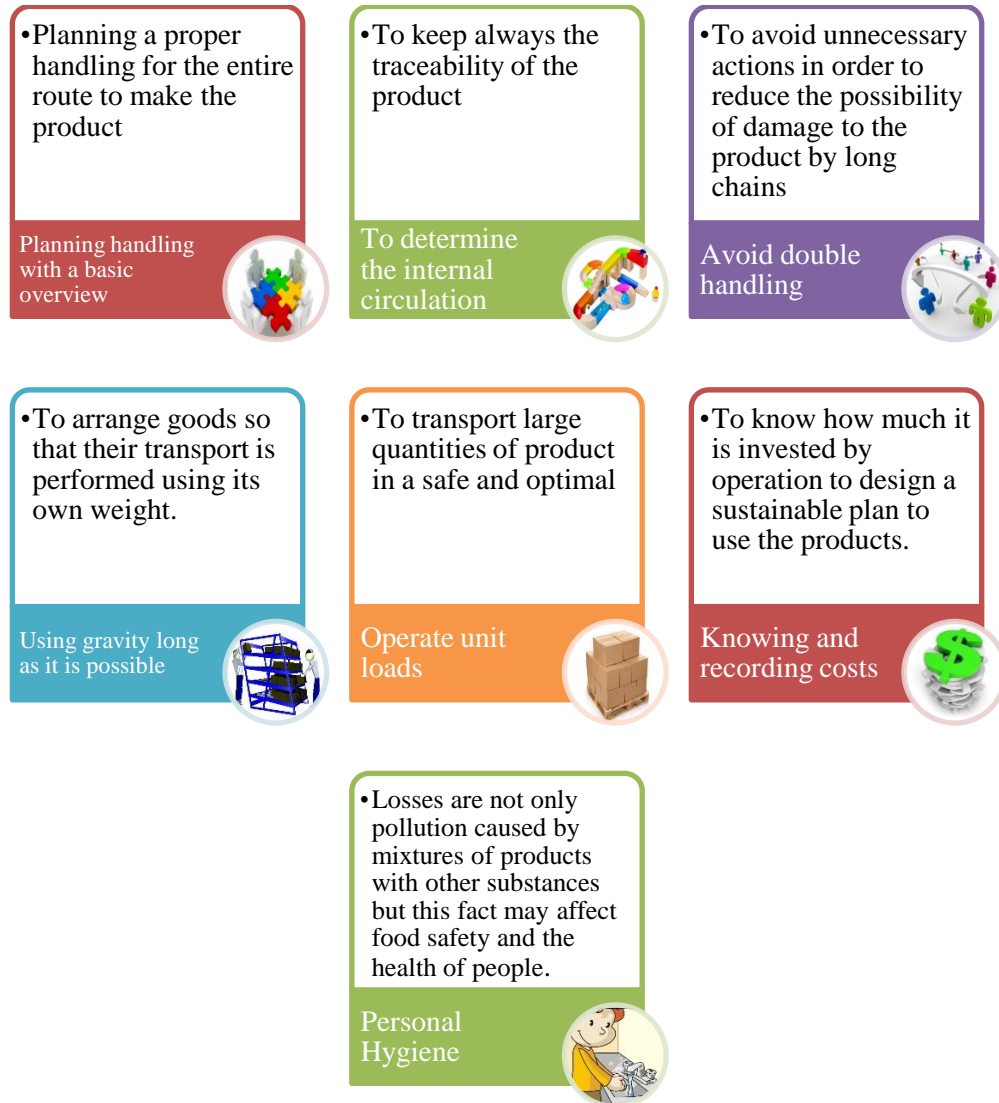


Figure 4. Food Rescue

In order to fulfill these principles is necessary to identify the return processes described in Figure 5:

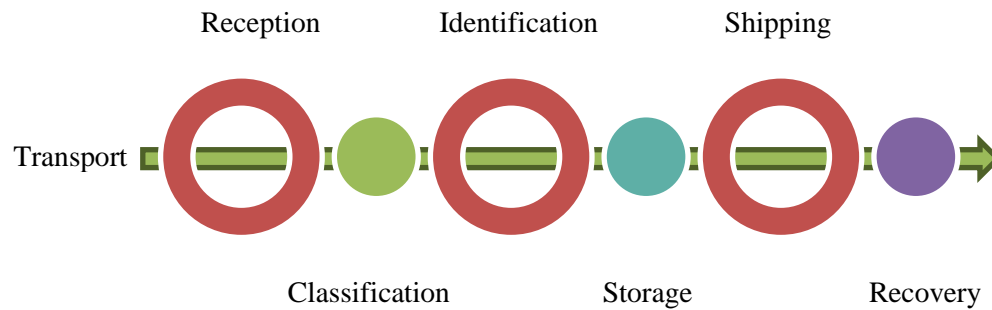


Figure 5. Principles of food handling

The following definitions for goods handling.

Transportation: Transportation is a horizontal process which may impact the return and consequently the product with donation potential cannot be used. This fact is subject to the type of transport (Refrigerated) and must meet some considerations (Figure 6).

Do not contaminate food or packaging	•Transportation must preserve the conditions of health and safety of the product.
Product can easily be cleaned and disinfected	•Load units should be formed so that the product is preserved in a suitable condition for recovery, guaranteeing consolidation and easiness to clean the objects used to transport food.
To allow effective separation among different products	•To separate adequately the different types of products helps reduce the risk of loss due to cross contamination.
To protect goods from contamination with correct packaging	•Appropriate packaging help reduce the risk of loss of product for contamination.
To maintain and to monitor ideal environmental conditions	•The environmental conditions directly affect the quality of the products that are so critical when properly convey good factor.

Figure 6. Considerations for food transportation. Source: (Food and Agriculture Organization of the United Nations, 2014)

Reception: Normally the reception is a point of transfer between two modes. To perform this process correctly, it is recommended to follow the next steps:

- Verification and counting: These operations can be made by two ways:
 - Detailed receipt at point of sale

- Receipt blindly into the distribution centers.
- Check receipt documentation for product traceability: This is done to ensure food safety throughout the process.
- Quality control: It generates the first filter to eliminate those products that cannot be consumed by humans.
- Transfer food to store to guarantee the product safe:.

Classification: Selection and separation of suitable and not suitable for human consumption. This process must consider the type of product listed in Figure 7.

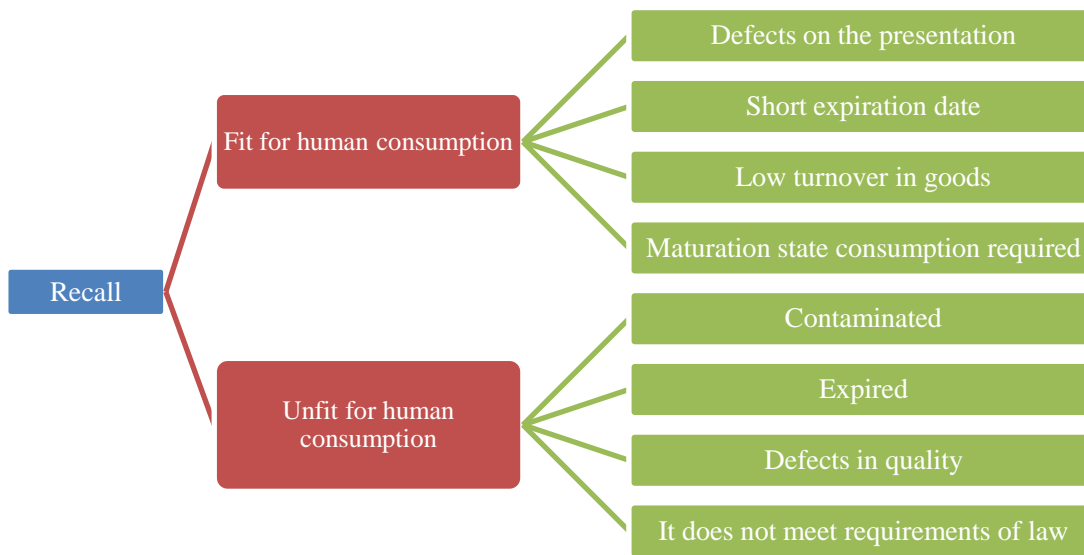


Figure 7. Products suitable and not suitable for human consumption Source: (Fundación Banco dels Aliments, 2009) (Hurtado, 2013)

Identification: After classifying products, the process of identifying and tagging those products that are consumable by humans. This process is carried out with the use of simple color codes which facilitates handling.

Storage: To place the product in the specific area preventing cross contamination as it is shown in Table 2:

Table 2. Matrix of cross contamination



	NO FOOD	NON-PERISHABLE FOOD	PERISHABLE FOOD
NO FOOD	No risk of contamination	High risk of contamination (Due to the chemical components of non-food)	High risk of contamination (Due to the chemical components of non-food)
NON-PERISHABLE FOOD	High risk of contamination (Due to the chemical components of non-food)	No risk of contamination	No risk of contamination
PERISHABLE FOOD	High risk of contamination (Due to the chemical components of non-food)	Low risk of contamination (For product status)	Low risk of contamination (For product status)

Some of the best practices are:

- Establish a discipline of “first - in due, first – out”, especially those next to expire
- To keep the record of availability to store in the distribution centers
- To ensure compliance handling and storage
- To monitor and to measure performance on actions to ensure shipments

In any of the operations, the process of storing must consider the actions outlined in Figure 8 to ensure the preservation of foods:

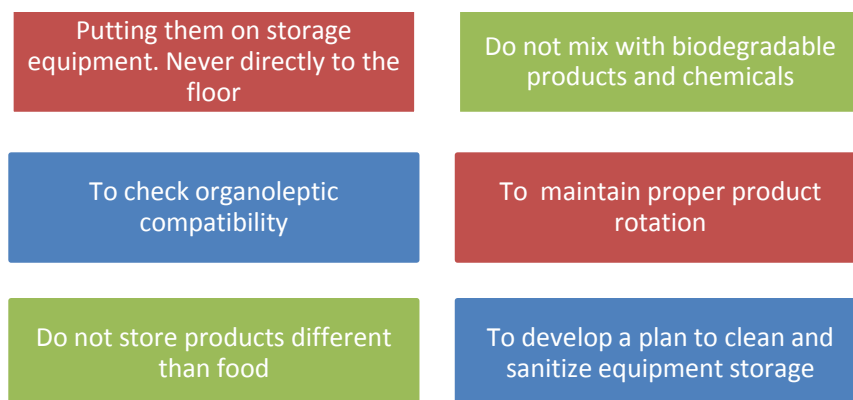


Figure 8. General measures to ensure food preservation

Source: (Center for Research and Development of Domestic Trade (CID - CI) and Cuban Society of Logistics and Marketing (SCLM) of the National Association of Economists and Accountants of Cuba (ANEC), 2006)

Recovery and shipment: Once sorted, identified and packaged products, this action corresponds to transportation of these products to the available warehouses.

The term food bank is loosely used by many organizations that handle food. Likewise, the way in which these organizations are run, how they handle food, the use of information systems differ from country to country. Some of the practices we identified as best practices in the world for food handling are presented in Table 3.

The list is not exhaustive but serves as a guideline for potential organizations willing to start a food bank.

Table 3. Best Practices in Food Banks

PRACTICE	US	UK	SP	RU	AU	BR	MX	CH	AR	CO	OBSERVATION
Free transportation				√				√			Normally given by donors
Shared transportation						√	√		√		Fee paid by the food bank, foundations or the donor
Centralized organization	√		√	√	√	√	√	√	√	√	A unique network manages all the processes for the food banks in the country
Salvage fee	√	√	√			√	√		√	√	A percentage of the original sale value to enhance Sustainability in the processes to help others in the future
Barter system among banks			√				√	√	√		To Exchange goods among food Banks without the need to use money
Manual traceability of donations	√	√			√			√	√	√	Tracking of the goods without using technology
Electronic traceability of donations	√	√									Tracking of the goods using technology
Fiscal and tax benefits	√	√	√			√	√	√	√	√	These benefits are given by the governments through laws to stimulate donations
Advertising	√	√	√		√	√	√	√	√		Visibility of the actions with the society
Logistic services	√	√	√	√	√	√	√	√	√		Donated or hired to perform the distribution from food Banks to the beneficiary
Software								√		√	To use some kind of software to manage the food bank and its operations
Voluntary work	√	√	√	√	√	√	√	√	√	√	People with the intention to help other voluntarily performing different activities in the food bank
Mobile food banks	√			√	√						The food Banks arrive directly to the communities

**US: United States, UK: United Kingdom, SP: Spain, RU: Russia, AU: Australia, BR: Brazil, MX: Mexico, CH: Chile, AR: Argentina, CO: Colombia*

Conclusions

Hundreds of thousands of tons of food are either lost or wasted while millions of people suffer from malnutrition. A plausible initiative are the food banks in which large retail chains and potentially other organizations can donate food. This food is collected and delivered by food banks to people in need. Such food banks have helped thousands of people but still the percentages are negligible as compared to the large quantities of food that are wasted with no more reason that destroying is cheaper. On the other hand, food banks have also their own problems: Poor distribution strategies, informality in handling and delivering food, lack of infrastructure, the mismatch between the supply and nutrition needs, among others. As consequence, research and actions are needed to improve the efficiency of food banks.

Local governments also have a role to play and it is still a lot to do: Public policies that encourage the donation of food as well strategies to decrease the consumer attitudes towards food wasted can be implemented without major investments. For example, reducing or exempting taxes to those who donate can be easily done without affecting heavily the public finances; implementing cultural campaigns to induce awareness of food as a scarce resource are also needed; promoting an equitable access to the food; enhancing manufacturers to donate in food covering in low-income population campaigns, etc.

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