

## Food waste in Greece: A case study

PhD Panousopoulou Pagona,

Email: panousopoulou@hotmail.com, Address: Baumwirtschweg 2, 44319 Dortmund, Deutschland

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### ABSTRACT

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The present paper is regarding the remaining food supply chain. Firstly, there's reference to humanitarian aid logistics. Starting with basic definitions, and continuing with discussing the significance of humanitarian logistics among modern supply chains, followed lastly by the presentation of main differences between business and humanitarian logistics. In addition, the main challenges faced by humanitarian relief organizations are provided and their connection to remaining food (food waste). The second part of this paper address the food waste produced in Greece and the reason for its production in households and catering businesses. For this paper, a survey conducted, involving 40 catering businesses operating in Greece. From the results occurred that the participating companies have developed a sense of humanitarian aid and contribute positively to humanitarian logistics.

**Keywords:** Remaining food supply chain, Food waste, Humanitarian organizations and rest food

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Date of Submission: 19-08-2017

Date of Publication: 20-09-2017

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## I. LITERATURE REVIEW

### 1.1 HUMANITARIAN LOGISTICS

Humanitarian organizations aim to provide humanitarian aid. Those organizations have a structure and processes similar to business logistics; however, they differentiate from them with regard to their purpose, that is not to procure profit but provide aid in relieving people from disaster.

Humanitarian organizations are governed by three principles, which differentiate them from business logistics. Their principles are essential in order for someone to understand their function and are presented below (Clark & Culkiii 2007; OCHA, 2010).

The «humanitarian space», created by the triangle of three principles, represents the resting area, where citizens offering aid are able to move and act freely, within the harsh reality of disaster, without conflicts and protected from soldiers' fire in was zones. Lines between soldiers and humanists are very thin and are sometimes violated. Even nowadays, safety is the main issue in humanitarian logistics operations.

Humanitarian organizations, other than providing humanitarian assistance in emergency situations, also perform and work in peaceful periods. There are many humanitarian organizations and could be divided into 3 categories (Kitsios, 2009):

- United Nations Agencies
- Intergovernmental Agencies
- Non-governmental Organizations (NGOs)

The latter category, NGOs, usually have local branches in many countries and are able to be the first responders during disasters (Nagumey, 2012). They have different operating segments, as well as logistics branches, running different activities, depending on the arising needs.

Nowadays, logistics of humanitarian aid chains are getting much more important. As the Emergency Events Database reports, incidents of humanitarian disasters increase each year from 50 to 400 in the last three decades. The main role of supply chain organization who aims to properly fight a humanitarian disaster, is illustrated by the fact that the transport and distribution costs of humanitarian assistance in a humanitarian disaster reaches 80% of all costs involved with event control (van Wassenhofe, 2006).

Research of humanitarian logistics could provide to business logistics with the following:

- Ability to respond quickly to changes in the logistics operating environment (responsiveness). The majority of humanitarian logistics encounter constant interruptions and difficulties in their operation. The processes they implement to cope with specific difficulties could provide useful data to business logistics for combating similar cases.
- Data to manage significant difficulties and risks, since humanitarian logistics specialize in this area.
- The consequences of a crisis are the difficulty of operations or the shutdown of commercial supply chains where the crisis occurs. Immediate handling of the crisis and resumption of normal operation of commercial

supply chains rely on the efficiency of humanitarian aid logistics operating in the area (Wallace & Webber, 2004). These crises affect greatly businesses' operations, thus several manufacturing companies with established operations in South-East Asia for cheap labor purposes tend to move their manufacturing plants in areas less affected by natural disasters (Wright, 2012).

All the above justify the interest in humanitarian logistics and the resources spent on research, development and application by governments, commercial organizations and businesses (Kovács & Spens, 2007).

The main differences between commercial supply chain logistics and humanitarian logistics are presented below:

- Purpose: Firstly, commercial supply chains work for profit. On the other hand, humanitarian logistics aim at increasing the humanitarian aid (Thomas & Kopczak, 2005).
- Mode of operation: Obstacles are rarely presented in commercial supply chains operations. Supply and demand are predefined, and usually remain the same, while the environment in which they operate does not present particular problems. On the other hand, humanitarian aid logistics manage with unknown and continually changing demand, as a result of different variables in their field, and absence of proper communication among many humanitarian organizations providing relief at the same event (Murray, 2005). Furthermore, even the offer may be unknown and variable, as financial or material resources are often unknown and unpredictable. Moreover, the areas of humanitarian logistics operations are usually in turmoil, resulting to problematic supply chain flow, whereas there may also be problems with the infrastructure (Cassidy, 2003).
- Significance of time: In commercial supply chains, 'time is money', while in humanitarian logistics time is relevant to human life, as any delay in providing humanitarian aid to a disaster area has consequences on preservation of human lives (Kovács & Spens, 2012).
- Funding sources: In commercial supply chains financial income occurs as a result of selling goods or services to public. On the other hand, humanitarian logistics income provided exclusively by donors, who possess and offer funds in order for the organization to achieve its purpose. Thus, business logistics companies due to economic incentives are funding expertise and improvements in the distribution mechanism and obtain more efficient delivery of goods, while humanitarian logistics more often encounter difficulties in distribution of goods (McLachlin, Larson, & Khan, 2009).

## **1.2 FOOD WASTE**

The study of food waste in Greece is a difficult task, because of the lack of an extensive and thorough research into the issue, and the almost total lack of public debate on this important social problem. There is a study carried out by Harokopion University, however it has a limited qualitative and quantitative range. Public debate regarding the phenomenon of food waste in Greece, was virtually non-existent until a few years ago. Nowadays, it is carried out almost exclusively by native civil initiatives (mostly NGOs) and academic institutions, and is not centrally coordinated by the state, as it happens in many developed countries, i.e. Great Britain, where food waste has become a major topic of public debate with remarkable results, and collection and distribution for many years is managed by NGOs.

For many years, the examination of food waste phenomenon focused mainly on the economically less-developed countries, where occur intensely the phenomena of hunger and malnutrition. However, the last two decades, food waste has started to be examined in developed countries, as a result of gradual change in public opinion regarding waste of resources in general. Additionally, more people in developed countries are forced to seek support in order to ensure their nutritional needs. Indicatively, in early 2013, United Nations, inaugurated the «Think.Eat.Save.Reduce your Footprint» program, aiming at drastically reducing food waste in rich countries, recognizing the importance of this problem.

In summary, food waste is categorized as a global phenomenon in the following areas:

- Primary sector
- Processing/manufacturing sector
- Wholesale
- Catering sector
- Households

Each sector's contribution to total food waste varies, depending on the economic level of development of a country. In less developed countries, waste mainly occurs at agricultural production and processing stages, thus much of food production is "getting lost on the way". For example, it has been estimated that India loses every year about 21 million tons of grain, i.e. same amount as the total production of grain in Australia, due to the lack of appropriate infrastructure, while the country is rating first having the most people worldwide below poverty line.

In most developed countries, food waste is approached as a phenomenon usually from the perspective of significant environmental impacts. Indicatively, according to a study conducted by the European Commission, food waste in EU will increase from 89 metric tons in 2006 to 120 metric tons of waste on 2020, due to population growth and disposable income, unless the countries enforce necessary measures, immediately.

In Greece, unlike other developed countries, the phenomenon is usually approached from the humanitarian perspective, namely the contradiction of food waste when many fellow humans facing food insecurity, due to economic crisis of recent years. This is a logical consequence of the extremely high unemployment rate occurring in Greece during recent years, and the reality that almost one third of the population live below or near the poverty line. Another consequence of the economic crisis is the reduce of food waste, but only indirectly, i.e. via the proven reduction of all household waste, which is another indicator of the reduction in disposable income and food consumption.

### **1.2.1 Reasons of food waste in households and the catering sector**

#### **1. Size of packaged food portions**

The dilemma here is whether to choose packaging of individual servings which implies greater packaging waste or packaging of many portions, which implies greater probability of food waste.

#### **2. Problems in product labelling**

Large quantities of food are wasted because of the consumers' propensity to treat various labels on products as the same, i.e. not distinguishing for example between "end date" and "preferably consumption before date". Because of this confusion among citizens, an important opportunity to reduce food waste in retail trade has been lost recently in Greece.

#### **3. Packaging Problems**

Special packages could significantly prolong shelf life of products, e.g. fivefold increase of shelf life of vegetables containing large amount of water, when wrapped in a special membrane.

#### **4. Storage Problems**

As noted above, this is the most significant problem to less economically developed countries, but is still important in developed countries, e.g. it has been estimated that 2 million tons of food is not properly stored every year in the United Kingdom.

#### **5. Incomplete information**

While more people in developed countries are now aware of the phenomenon of food waste, few have changed their habits or actively trying to reduce their own waste. In Greece, there's a distinct gap in comparison with other European countries on informing people about the phenomenon.

#### **6. Preferences**

Large quantities of food are wasted because of dietary preferences of consumers, e.g. wasting the peels of potatoes or apples, the crusts of bread, etc. This food waste factor considered the most difficult to change, according to relevant studies.

#### **7. Planning**

Planning of purchases in a household is considered an important food waste factor, especially in a country like Greece, whose population only recently showing signs of mature consumer behavior due to economic crisis.

#### **8. Socio-economic factors**

Changes in the social structure in developed countries, which occurred the last decades, with a significant increase in individual households, plays a role in increasing food waste, as individual households have a stronger tendency to waste in relation to more crowded households. This trend can also be observed in Greek society.

In manufacturing and wholesale sectors, the main reasons for food waste are focused on logistical reasons and problems with transport and storage (mporoume.gr).

## **II. RESEARCH METHODOLOGY**

The aim of the survey conducted as part of this study is to investigate the remaining food (food waste) supply chain. The formulation of the problem was followed by selection of research method, which was decided to be quantitative data collection using a questionnaire. Quantitative research was used for this study. Restaurants and taverns were selected to be sampled and a total of 40 questionnaires were distributed, while 32 questionnaires were returned.

The survey was conducted from September 2016 to November 2016 in Athens. It was based on self-completion, which did not require more than 15 minutes and was completed under the supervision of the investigator, a method that provides the advantages of both personal interview and self-filling. Thus, it was ensured the best quality of data collection, as the researcher was able to motivate the respondents, clarifying questions where needed and explaining the point of each question, minimizing the number of unanswered questions. The same

series of questionnaire completion was implement to all respondents. There was no limitation on age or any other factor regarding sample selection.

### **III. RESULTS**

The aim of the survey, which was conducted as part of this study was to investigate the remaining food supply chain. The survey involved 50 people, 50 catering business representatives, most of which were male, with ages up to 40 years, working as business managers or waiters, mainly graduates of secondary education or technical schools. Regarding the businesses, whose representatives participated in the survey, the majority of those engage in catering for over 10 years, occupy fewer than 15 employees and cater mainly to individual customers. All companies surveyed stated that they implement a food safety standard, and the type of products they serve was either fast food and cooked food. The second part of the survey included questions about excess food and disposal. As occurs from the aforementioned results, most companies have been involved in humanitarian aid in the past, offering mainly food. It is remarkable that those businesses that weren't involved with humanitarian aid in the past would be interested to participate for this cause. Most of the companies surveyed, produce 220 servings of food per day on average, which is not fully consumed by customers. Therefore, there are quantities of remaining food. Results showed that average quantities of 8-12 servings of prepared food remain daily. Remaining raw materials consist mainly of meat and vegetables. Remaining food consists mainly by ready meals, is mostly suitable for consumption, while managing it includes sharing it with poor people or donating it in institutions. The usual quantities of remaining food donated is about 8 portions and the donation occurring daily or every 4 days from some businesses. Regarding the delivery of remaining food, most participants offer packaged food. As for quality and safety of the remaining food offered to poor, most of the participants in the survey are not concerned. However, all of the participants would like to be a reference to the name of their business or their name in any offer. According to the replies received by businesses, the decision to distribute their excess food is related to their desire to aid people in need, the desire of the company to show its people-centric management and commitment to society, the desire of the operator to improve company's name among customers, the low cost of the project, the focus of business to community and the desire of the company to get better known in the community.

With regards to the obstacles presented in the exploitation of remaining food, none is considered particularly important by the companies. More specifically, the majority of participants did not consider important in managing of remaining food the following obstacles: difficulty in networking with local community, difficulty in selection of excess food distribution criteria, difficulty in finding collaborators, difficulty in finding time, difficulty of managing the project, as well as difficulty of managing the extra cost.

Businesses involved with donation of remaining food would benefit from the implementation of an excess food distribution program through networking with consumers, development of cooperation with external entities, acquirement of greater reputation, better management of stocks and food supplies and development of a more ethical orientation.

Finally, regarding the bodies that could aim in excess food distribution effort, among them were found the church, private bodies, non-profit organizations, charitable organizations, the municipality and social voluntary organizations.

### **IV. CONCLUSIONS**

In summary, according to the results of the survey, the participating businesses have developed a sense of humanitarian aid and contribute positively to the humanitarian supply chain. The phenomenon of food waste is extremely large worldwide, as well as in Greece; however, after the initial step of problem recognition, should follow the steps of changing our approach of the phenomenon, informing public opinion, changing attitude and activating state and supranational mechanisms, and many NGOs, creating an optimistic message that the current situation may improve drastically in the near future for the benefit of people and the environment.

Humanitarian aid logistics is a supply chain of absolute necessity and response. Regarding remaining food, more than 2,000 portions of excellent quality food is saved daily from wasting and is distributed it where there is needed from various non-profit companies. Volunteers partake to excess food management and promotion of donation for charitable purposes in every corner of the country. Moreover, they encourage people not to waste food. Non-profit companies operate in Greece for almost two years as a communication node among food donors and recipients, creating "bridges" between the individual donor and the most appropriate recipient. The aim is to develop a new movement that will bring out the social awareness of citizens and businesses, through the creation of an innovative food utilization model, through which food would not be wasted but offered to more people who fail to meet their nutritional needs, as a results of the economic crisis.

Hopefully, more relevant organizations will be created in the future in order to provide real humanitarian aid and carry out important work in food waste management.

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PhD Panousopoulou Pagona. "Food waste in Greece: A case study." *The International Journal of Engineering and Science (IJES)*, vol. 6, no. 9, 2017, pp. 56-60.