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NEW MANAGEMENT TECHNIQUES TO REDUCE WASTE IN SICILIAN AGRI-FOOD CHAINS*

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Abstract

The 2030 Agenda for Sustainable Development, specifies 17 goals among which the second one: ending world hunger, achieving food security, improving nutrition and promoting sustainable agriculture in order to guarantee the reduction of food waste. The goal of this paper is, therefore, investigating the methodologies to reduce food waste. To this end, we present an application case study in the MAAS Agri-food center: the Mediterranean logistics hub and pride of the wholesale fruit and vegetables, fish and floriculture markets. MAAS has decided to adhere to the “Law n. 166 of 19 August 2016” for the waste reduction. The purpose is promoting the recovery and donation of surplus food, giving priority to human use. MAAS is open to collaborate with the Banco Alimentare Foundation, which deals with the collection of foodstuffs and the recovery of surplus food from agricultural and industrial production and therefore, the recovery of vegetable waste with a view to a more efficient use.

Keywords: food waste, green economy, ethical sustainability, food bank, social benefits

1. Introduction

Energy supply has always been one of the most important strategic variables for the life of a country as well as that of every person, but today there is a renewed sensitivity

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towards the social and economic convenience of sustainable development (Clasadonte et al., 2013a). In this regard, the Green economy was born, defined by the European Commission as “an economy that generates growth, creates jobs and eradicates poverty by investing and safeguarding the natural capital resources on which the survival of our planet depends” (Ronchi, 2019). In the last year, companies operating in the Green Economy sector have grown in revenues by 35%, an average higher than the European one, which bodes well for the future of the green economy in Italy and in the rest of the world (Giuffrida et al., 2019).

It considers itself capable of both creating green jobs and ensuring real, sustainable economic growth by preventing environmental problems such as environmental pollution, global warming, depletion of resources (mineral and water), and environmental degradation, (Castellani et al., 2013).

According to the United Nations Environmental Program, the Green economy is an economy in which the growth of income and employment are driven by public and private investments that aim to reduce pollution, increase renewable energy, efficiency resources and avoiding the loss of biodiversity (Loiseau et al., 2016).

While, Fondazione Impresa (a research institution on small business and the Green economy) states that it is not an abstract concept and defines it as a model of economic development that originates from an econometric analysis of the system and that, in addition to the benefits obtained from a certain production regime (such as the increase in Gross Domestic Product), it also takes into account the environmental impact and the potential damage created by the entire transformation cycle (Clasadonte et al., 2013b). In fact, these damages often have repercussions in a subsequent reduction in GDP caused by the damage to activities that benefit from a healthy environmental context, such as agriculture, fishing, livestock and, last but not least, tourism (Cianciullo and Silvestrini, 2010).

Some tools to support companies in the path of circular economy are voluntary system certifications (EMAS) (EMAS 1836, 1993) and voluntary product certifications (LCA) (Matarazzo et al., 2015). LCA is an environmental assessment methodology applicable in every industrial or service sector that provides a global and detailed view of the system under observation, in order to: highlight and locate opportunities for reducing environmental impacts related to the life of the products (Ingrao et al., 2015); support internal decisions regarding interventions on processes, products and activities; constitutes the initial step for any EPD Environmental Product Declaration (Guinée et al., 2010); the concept of environmental technology defined in the ETAP (Environmental Technologies Action Plan) embraces an extremely broad field, covering “all technologies whose use is less harmful to the environment than the main alternatives” (Pluchino, 2014); the environmental report, which is a document with which the governing bodies of an organization (public body or company) report on their commitment to the environment and the effects on it of their activities (Pluchino, 2014); the international standards ISO 14001 (2015), which represent a voluntary tool to improve environmental management within the organization, the model of environmental management system followed by the standard is based on the methodology known as PDCA (Plan - Do - Check - Act) (Corsaro and Catelani, 2013); renewable energies or those sources of energy whose use respects natural resources and, in general, the health of man and the planet, these are resources considered inexhaustible, including for example solar energy, wind energy, biomass, geothermal energy and hydraulic energy (Galgano, 2015). This paper dedicates the application part to the green economy implemented in its ethical and social principles (Matarazzo et al., 2019).

The main objective of this study is to focus attention on issues relating to the green economy and food waste, proposing a case study in the MAAS agro-food center in Catania, through the analysis of economic, legislative measures and strategies aimed at the reduction of food waste, the increase of knowledge on the quantities and causes of waste, the support

for planning the integration of prevention measures and the sensitization of consumers to the reduction of waste. The goal is precisely that of obtaining a growing environmental awareness through ethical considerations, stimulating the consumer to seek a healthy lifestyle, through meals and their reduced consumption.

2. Case Study: MAAS S.c.p.A.

In order to achieve this goal, we propose a case study in the MAAS Agro-food center (www.maas.it), with the collaboration of the Città Metropolitana (www.cittametropolitana.ct.it). The Città Metropolitana of Catania is the large-area body, intermediate between the Sicilian Region and the 58 Municipalities of the area of competence, which has among its strategic objectives the reduction of waste and, above all, the prevention in the production of the same; MAAS is a joint stock consortium company, founded in 1989 in implementation of Law 41 (1986) for the creation of fruit and vegetable, fish and horticultural markets. The founding members are the Sicilian Region and the Federmercati Association (representation of fruit and vegetable wholesalers). It is the Agri-food center of the city of Catania and logistic hub of the Mediterranean, based in Catania in via Passo del Fico SP70/IC/da Jungetto, it covers an area of about 1,100,000 square meters and hosts 78 companies in the fruit and vegetable sector, 20 companies in the fishing sector and other activities including refreshment areas, tobacconists, packaging companies, special vehicles etc. The MAAS was set up to specifically meet the needs of general interest, including those of a commercial nature, and its administrative body is made up of members, more than half of whom are designated by a local public body. In creating the markets, the Company will comply with the provisions dictated by national and community planning, with the directives set by the CIPE for the implementation of the objectives referred to in Article 11 of Law no. 41, as well as the regional legislation of the sector.

The company aims to guarantee the distribution of fruit and vegetables, agro-fish-food and horticultural products in general in the best state of freshness, conservation and sanitary conditions, in relation to current laws; maximum dissemination of information with reference to the quantities of product marketed and their prices; the conditions for the formation of prices in the most balanced way and in accordance with the cost components; The achievement of these objectives is pursued through logistic, real estate, entrepreneurial and service strategies that take into account the geographical position of the agri-food center, the product range and the totally innovative services that will be provided (MAAS, 2019).

Behavior towards customers / dealers is based on availability, respect and courtesy, with a view to a collaborative and highly professional relationship. The Company also undertakes to be consistent with the principles of impartiality and equal opportunity, also protecting the value of fair competition by refraining from collusion, predatory behavior and abuse of a dominant position. The purchasing processes are based on the search for the maximum competitive advantage, on the granting of equal opportunities for each supplier, on loyalty and impartiality. The selection of suppliers and the determination of the purchase conditions are based on an objective assessment of the quality, price and ability to provide and guarantee an adequate level of service. The company undertakes to avoid discriminatory behaviors or attitudes in the procedures preordained for the stipulation of contracts. In addition, the MAAS engages in solidarity activities for the help of less fortunate people, recording important numbers.

As part of its institutional activities, MAAS has stipulated agreements with Sicilia Agriculture, Coreras, the Catania Chamber of Commerce.

3. Materials and methods

Half of the food that is produced in the world, about two billion tons, ends up in the garbage, although it is largely edible. The figure, which emerged from a January 2013 report by the institute of mechanical engineers, the association of British mechanical engineers, was gradually confirmed by several subsequent studies on a continental scale. There are 821 million people in the world who still suffer from hunger. And for the third year in a row their number has increased. This is what emerges from the new United Nations data on global food insecurity (Tintori, 2014).

To counter the growth of fame globally, a reversal is needed: putting human rights at the center and building a fair and sustainable food system. First of all, it means investing more in small-scale agriculture, it also means intervening for a massive reduction in greenhouse gas emissions, largely produced by a model of intensive agriculture and therefore unsustainable for the environment (Perli, 2014).

Secondly, to support the adaptation of smallholder farmers, especially in poor countries, to an increasingly extreme and unstable climate. We intend to focus the reader's interest on good behavior practices in order not to waste food, which is a primary good and of inestimable importance for the world population and, without which, one could not live (Torrìsi, 2018). The most used term is "food waste", but in reality the loss of food produced and not used occurs in many ways for which scholars and FAO itself distinguish between: loss of food, i.e. the unintentional reduction of food intended for human consumption resulting from inefficiencies in the supply chain and food waste, i.e. the intentional discarding of edible products, due to the behavior of companies and individuals. The term food waste refers to the combination of the two previous terms. Industrialized and developing countries waste, respectively, 670 and 630 million tons of food each year (FAO, 2011). In particular, there are three different categories based on the degree of avoidability of the mirrors: avoidable, possibly avoidable, unavoidable. It is also possible to distinguish between "absolute waste" and "relative waste", based on three different destinations: products disposed of as waste (they have no economic value, they are not food for humans); products intended for animal feed or gas production, or compost (they have economic value, they are not food for humans); products recovered and donated for human consumption (they have no economic value, they are food for humans) (Pesenti and Rovati, 2015).

Relative waste is defined if the destination makes it possible to obtain at least one of the two potential benefits selected (economic return, use for human consumption). By absolute waste, on the other hand, we mean the destination of the food surplus that generates neither of the two benefits (Segrè and Falasconi, 2011). Furthermore, to prevent losses we can talk about reuse and recovery. Often these two terms are used to express the same concept, but in reality they are two concepts very different from each other. If reuse is an immediate action and means reusing an object that has not yet become waste, for the same purpose for which it had already been used previously, recycling instead, leads to a real transformation, and means recovering and reusing waste and waste materials in order to give a second life, which is the same as the previous one or different, to objects or products (www.prevenireleperdite.it). In 2015, in Europe, the quantity amounted to 89 million tons, or an average of 180 kg per capita (www.expo2015.org). The highest domestic waste per capita is recorded in England, with 110 kg per person, followed by the United States (109 kg) and Italy (108 kg), France (99 kg), Germany (82 kg), Sweden (72 kg). Among the causes of this mass waste are the bad habits of millions of people, who do not store products properly. But also the too strict expiration dates affixed to food, the promotions that push consumers to buy more food than necessary, the numerous steps from producer to consumer in industrial food assembly lines and little sensitivity towards food sustainability issues (Balocco, 2017;

Fioravanti, 2019). The “Zero Waste” law proposal, GADDA Law 19/08/2016 (Law 166, 2016), starts from the assumption that the waste of food is a negative phenomenon as it in turn involves the waste of natural resources in the process of production and increases carbon dioxide emissions, thus proving to be a far-reaching measure because it proposes to create a virtuous circle in the reuse of surpluses starting from the basic social context. Food waste affects the entire agri-food chain, consisting mainly of the following phases: agricultural production; production of food raw materials; transformation phase; distribution phase; and finally domestic consumption (Garrone et al., 2012). In the agricultural production phase, the factors that determine waste are: climatic factors (drought, hail), spread of diseases and pests, inadequate means of transport, inadequate conservation of products; during the transformation phase of a food (e.g. harvesting of fruit and vegetables, slaughtering of meat, production of jams, sauces, yoghurt and subsequent labeling and packaging) transport is one of the factors that most compromises the good conservation of the product (which, if dented, is discarded) but also the need to respect aesthetic standards, are very often the basis of fruit and vegetable waste; in the subsequent phase of distribution (in large, medium and small sales structures), the large-scale retail trade makes available on average 80% more food than the needs of the population (Garrone et al., 2015). The European Union projects for 2030 aim to make all plastic packaging recyclable, with initiatives that follow from the distribution of food and detergents “on tap” to the design of low-impact points of sale. Large-scale distribution in general aims to adopt in the future a logic called “Plastic-free” which literally means “free from plastic”. This is the name adopted by those Italian municipalities that first decided to take sides against the use of plastic, in an attempt to safeguard the seas and territories (Rapisarda, 2019). What is offered on the shelves not only abounds, but must meet the aesthetic standards imposed by large retailers; and finally in the phase of domestic consumption, especially in industrialized countries, there is a high percentage of waste. (www.ambienteitalia.it).

4. Results and discussion

Food waste in Italy is worth over 15 billion euros in 2018, almost 1% of GDP (0.88%), and most of the food is thrown into our homes, with a domestic waste that is close to 12 billion. euro against only 1/5 of the total waste represented by production / distribution, (Covatta, 2018).

According to a statistical survey published by the Waste Watcher Observatory on domestic food waste of Italian families by Last Minute Market/Swg on a sample of 1500 subjects, it is bread, vegetables and fresh fruit that end up in the dustbin more often, along with legumes and drinks alcoholic, but the trend is virtuous: two out of three Italians declare that they throw away food once a month or more rarely, even if for a slice of Italians the habit of throwing food every day or several times a week remains. To reduce waste according to 65% of the sample analyzed, it is necessary to check what is really needed before shopping, while many believe that it can help to freeze foods that cannot be eaten soon. Another party suggests paying attention to the amount of food to be cooked and finding a good solution is to use leftovers and scraps for new recipes. Only 2% believe it is a good habit to give over cooked food to neighbors. One wonders how to solve the waste problem: 72% need to focus on food education, 26% believe that it is necessary to create new generation packaging and 20% propose to adopt legislative measures with incentives and sanctions. The most interesting fact is that the sensitivity of consumers to this issue has increased sharply in recent years. Waste is perceived above all in large-scale distribution because it is precisely there that consumers go to shop. This is where we see that the goods are often damaged and a few kilos of bread are thrown away. But if we put together all the

bread we throw away in our homes, even if they were only 10-15 grams and multiplied them by the 60 million we are, we will see that that figure would explode and exceed what happens in large retailers (www.theforkmanager.com).

In the most industrialized countries, such as our Italy, more than 50% of all waste occurs in our home, when we cook, eat or clear away, while in developing countries it is wasted especially during and after the collection of food, due to problems related to technical tools and the scarce possibility of storing food in the moments after harvesting. This means that the technologies we have available in Europe, the possibilities for the preservation of food, represent a real fortune and should not be wasted. In the early stages of food production, the main causes for which we waste are technological and environmental. It can happen, for example, that a hailstorm arrives and destroys the farmer's beautiful field. Or, if we think about the breeding of animals for slaughter, technical problems may arise involving the tools in the industrial plants or the machinery used (Perli, 2014). Subsequently, the waste is related to the leftovers, in fact, most of the time they are thrown away without thinking of being able to finish them in subsequent meals. Even if in recent years there have been emerging strands of studies that focus precisely on the management of these leftovers, such as for example the kitchen of waste or food preparations in which, as ingredients, edible materials that cannot be used in previous preparations enter, for example the peel of potatoes or even with expired foods (Adelfo, 2017).

One of the key elements to reduce food waste is to be identified in improving the efficiency of the supply chain: digital solutions for its management allow better alignment between supply and demand, make transactions more efficient, enhance the traceability of waste and give possibility of carrying out dynamic pricing based on the calculation of the residual shelf life.

Considering the various phases of the transformation and production process of the agri-food chain, food waste is due to several factors: for example, in the distribution phase, the factors that should not be underestimated are packaging that is not intact or damaged, incorrect planning of supplies, promotional offers; in the catering sector, the causes of waste are related to excessive size of food portions, poor attention to food quality, poor distribution of doggy bags (www.nonsprecare.it).

MAAS has decided to adhere to the "Law n. 166 of 19 August 2016" for the limitation of waste, the conscious use of resources and environmental sustainability, to sink its roots in the fabric of social and environmental solidarity (Law 166, 2016). Specifically, the MAAS and Città Metropolitana, within the framework of the "Generous Heart" memorandum of understanding for the reduction of waste within it, as well as for the reuse of unsold basic necessities, with the destination to the weakest groups, has sold free of charge food surpluses to non-profit organizations that deal with distributing them to the poor and pursues the goal of allocating unsold fruit, vegetables and fish products to associations engaged in territorial projects for the distribution of food to needy families and social canteens. The foods sold are those with the minimum storage term even exceeded but with the primary packaging intact and above all in compliance with suitable storage conditions. Furthermore, it is open to collaboration with the Banco Alimentare Foundation which has as its main purpose the enhancement of food surpluses for charity. Whole products, still edible, but which for reasons mainly of the market can no longer be marketed by companies and large-scale distribution and have thus lost their economic value are collected and distributed free of charge, through a network consisting mostly of volunteers, to affiliated charity structures, with quantities calculated on the basis of the number of assisted persons and needs (Paternò, 2001).

On the occasion of the Covid-19 emergency, in which there was a growing increase in social poverty and the limitation or impossibility of procurement and supply by thousands of

people, the Metropolitan City of Catania, the Water and Waste Department of Sicily Region, the Regional Civil Protection Department together with the Food Bank of Sicily Onlus have set up a “Generous Heart” switchboard to help families in difficulty.

In this emergency period, the Protocol has made it possible to help more than 500 families also by activating voluntary civil protection associations. In this, about 35 tons of fruit, vegetables and fish products were donated.

The MAAS has in fact implemented correct operating practices, within its HACCP system, in order to ensure the hygienic and sanitary safety of food in accordance with the provisions of Regulation 852/2004 of the European Parliament and of the Council (Regulation 852, 2004).

Each month the MAAS produces about 118028 kg of waste per month, distributed among the so-called Nobles, MSW and Wet, with the initiative in question the company tried to reduce the amount of waste to be sent for disposal. From the start of the project in March 2020 to date, about 34,883 kg of goods have been donated by various suppliers and in particular goods belonging to fruit and vegetables.

For the purposes of applying the Gadda Law, the transferring company, for each individual transaction, must prepare a “Transport Document” (DDT), progressively numbered, or an equivalent document, containing the indication of the date, the identification details of the transferor, the transferee and any person in charge of the transport, as well as the quality, quantity or weight of the goods transferred. The beneficiary (ONLUS) must make a specific declaration of use of the assets transferred, to be kept in the records of the transferring company, indicating the details of the DDT, and in which he certifies “his commitment to use the goods received directly in accordance with the institutional purposes, and that, under penalty of forfeiture of the tax benefits provided for by this decree, it realizes the effective direct use for non-profit social solidarity purposes”.

The Metropolitan City of Catania, as the control body for waste management, ensures that the procedures are carried out in compliance with the sector regulations and monitors the waste avoided that must be discounted by the overall municipal TARI (Waste Rate).

5. Concluding remarks

The paradox between food shortage and waste is a widespread phenomenon worldwide. The solution to the problem exists and is to be found in corporate social responsibility and technological innovation. Companies, and specifically large retailers, can obtain important benefits from the integration, within their strategy, of processes aimed at transforming a problem such as food waste into a resource, with economic, social and environmental impacts. Focusing on sustainability not only contributes to solving the problem but can help improve profit and the relationship with consumers. A positive response, therefore, the Italian one, in line with the European 2020 strategy and which could be taken as a model in a debate that saw the European Parliament last May 16 approve an initiative resolution on Efficiency under the profile of resources: reduce food waste, improve food safety.

An issue on which the European Parliament already with the resolution of 19 January 2012 dictated the guidelines on “How to avoid food waste: strategies to improve the efficiency of the food chain in the EU”. Food is a precious commodity and that food waste has high social, economic and environmental costs is an acceptable approach. Instead, there is a need to establish a hierarchy of actions: the redistribution of food surpluses for human consumption as a priority measure, immediately followed by prevention. The National Day Against Food Waste therefore offers us an opportunity to reflect on the impacts that the economic system and, in particular, the agri-food system generates on a social and

environmental level on a local and global scale. The idea is to focus attention and operational commitment no longer on measuring food that is wasted but on measuring food that is recovered and redistributed, with a new approach to the issue of food waste, distinguishing between Food Loss, Food Waste and Food Surplus.

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