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Approaches of the German food industry for addressing the issue of food losses

Beate Richter *, Wolfgang Bokelmann

Humboldt-University Berlin, Department of Agricultural Econimics, Chair "Economics of Horticultural Production", Germany

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ABSTRACT

In the food industry the subject of food losses is of great importance due to economic balance and an efficient application of resources as well as the development of an efficient food chain system. This paper presents the explorative results of a quantitative survey of leading companies of the German food industry to evaluate the relevance and handling of this issue. The investigation reveals that the topic food losses have a high significance in the food industry which will probably increase in future. A sample breakdown by branches indicates that the issue has the highest relevance for companies in the confectionery industry. These companies as well as those in the meat and fish industry want to consider the subject prospectively more powerful in their companies. Across the food industry, there is no communication to consumers of the efforts concerning food losses. And companies in the confectionery industry and in the fruit and vegetable industry rather want to engage more powerful in this topic if consumers' interest increases. But in order to minimize food losses at all stages along the supply chain, communication and collaboration at all stages is essential, especially the communication to consumers. Thus, it has to be verified whether a suitable communication can lead to advantages in competition and become an important issue for companies to differentiate from competitors.

1. Introduction

1.1. Background and objectives

In recent years, the level of interest regarding the determination of the quantity of food losses increased (Katajajuuri et al., 2014; Levis et al., 2010), even in the realm of politics (Katajajuuri et al., 2014; Lebersorger and Schneider, 2011). The prevention of food losses is of high relevance from the economic point of view and regarding the combat of hunger, as well as the improvement of food security (Garrone et al., 2014; Beretta et al., 2013). In total, the highest quantity of food losses arises in households (Kranert et al., 2012; Gustavsson et al., 2011; Monier et al., 2010; Parfitt et al., 2010). Therefore only separate studies have been carried out along the entire supply chain or on several parts of the supply chain, despite households (Katajajuuri et al., 2014), and mainly deal with the amount of food losses than with the handling of the issue.

By 2020, a quantitative increase of food losses within the EU-27 of 42% towards 2006 to 126 million tons is predicted, if no further prevention measures or activities are implemented (Mirabella et al., 2014). In the light of this and with regard to growing population and increasing urbanization, it is of high relevance to address this issue. The increasing demand, especially for dairy and meat products, leads to the necessity of a rise in food production from 60 to 110% by 2050 (Garnett, 2013; Nellemann et al., 2009). Additionally, food production contributes to a use of limited natural resources such as freshwater, fossil fuel, land and mineral fertilizer (Eriksson et al., 2014). Agricultural production uses approximately 70% of freshwater and thereof one-quarter of freshwater is used for food, which is not conduced for human consumption (Hall et al., 2009). The highest amount of stored energy in the garbage show dairy products and vegetables (Cuèllar and Webber, 2010).

The reduction of production losses in the food industry can lead to a lower application of raw materials, reduce the processing of food and improve the quality of the product (Guiseppe et al., 2014; Akkerman and van Donk, 2008). In this way, external effects could be minimized (Buzby and Hyman, 2012) and advantages in competition reached through improving environmental activities of the company (Akkerman and van Donk, 2008). In the process one of the greatest challenges, for scientists and industry professionals, is the necessity of improving food quality and reducing food losses along the entire supply chain. Therefore, new concepts

* Corresponding author at: Humboldt-University Berlin, Department of Agricultural Econimics, Chair "Economics of Horticultural Production", Germany.
E-mail address: richtbqb@student.hu-berlin.de (B. Richter).

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for planning and controlling the supply chain have to be developed and implemented. New advanced technologies for the traceability of food, as well as strategies for shelf life, are examples of current efforts with the target to increase the sustainability of the food supply chain (Guiseppe et al., 2014).

However, food production has risen in recent years considerably. Especially due to rising yields, as a result of irrigation, the use of fertilizers and an extension of agricultural production areas, the food production expanded (Nellemann et al., 2009). Currently more food is harvested than necessary for feeding the world population (Weltagrarbericht, 2009). This is a contradiction: on the one hand food is wasted and on the other hand, the production of food has to be expanded to feed the world. It will not be possible to distribute all food surplus to needy people. But especially according to the environmental impairment, food losses should be avoided along the entire supply chain. The current stage of investigations in the food industry with regard to the treatment and perception of this issue, is low. Thereby the aim of the present study was to examine to what extent the issue of food losses is considered and treated in the German food industry.

1.2. Food losses in manufacturing companies

In the EU-27, 39% of food losses can be traced back to the food industry. The highest amount of food losses within the EU-27 accrued in the United Kingdom, followed by Germany, France and the Netherlands. In Germany, 18% of food losses occur in manufacturing industries. In the EU-27, the highest amount of food losses occurred in manufacturing industries in Poland (7 million tons), the Netherlands and Italy (each 6 million tons) (Monier et al., 2010).

Reasons for food losses are manifold and depend on the level of the supply chain where they accrue (Guiseppe et al., 2014; Lipinski et al., 2013; Mena et al., 2011). Buzby and Hyman (2012), Kranert et al. (2012), Lipinski et al. (2013) and Schneider (2009) stated that the main causes for food losses in manufacturing companies were damaged or spoiled products, unsuitable products for processing, bad order forecasts, overproduction or excess stocks. Additionally, food is often wasted in the food industry in case of inefficient management, like a lack of a good supply chain network or changing products. Further exogenous factors, like a break in the weather, natural availability of food and/or seasonal effects of supply and demand, lead to food losses in manufacturing companies, too (Mena et al., 2011; Akkerman and van Donk, 2008).

1.3. Reducing food losses in manufacturing companies

There are diverse possibilities to reduce food losses in the food industry. One may be food donations, for example of unsold products. Food donations could additionally contribute to improving the image of a company (Buzby et al., 2011). But the possibility of food donations, for example to enhance undernourished people, is not used very often. Companies fear to compromise their reputation in case of improper handling of donated products. This applies especially to products shortly before expiration date (Guiseppe et al., 2014). According to the quantity of food losses in 2009, less than 3% of food losses were donated (Buzby and Hyman, 2012), although this could be a way to reduce food losses, and could be socially and ecologically advantageous as well (Beretta et al., 2013).

One of the biggest problems in conjunction with food losses is that the costs are commonly undervalued and hidden. Foremost, for industries with low margins, effective waste management is important for increasing their profitability (Mena et al., 2011).

Contrary to natural restrictions, numerous possibilities exist for management to minimize food losses: exchange of information, predictions and orders, performance measurement, management of cold chain, education, quality management, responsibilities in waste management, promotion management and packaging (Mena et al., 2011). Also, larger batches could reduce food losses and can be reached through longer planning horizons (Akkerman and van Donk, 2008). Further, close collaboration between retail and supplier is crucial for specifying predictions and for improving the promotion management (Mena et al., 2011).

Waste recycling, for example using not consumed food for biogas plants, is the most economical process of the production of renewable energy and for cleaning the environment (Yasin et al., 2013). Another solution is food for delivery for livestock, zoo or pets (Buzby et al., 2011). However, not consumed food or food surplus can be used to support not-for-profit organizations that are crucially important for undernourished people (Guiseppe et al., 2014). In theory, the industry should inherently have an economic incentive for minimizing food losses (Buzby et al., 2011). Different forms of knowledge interact with various behaviours. The diverse connections between heterogeneous knowledge and behavior show that a combination of different approaches is necessary to differentiate sustainability effectively (Redman and Redman, 2014).

2. Material and methods

2.1. Analysing methods

According to the goal of this study, to examine the treatment and relevance of the issue of food losses in manufacturing companies, the methodical implementation was carried out with an online company survey using a standardized questionnaire. Within the questionnaire, the relevance of the topic food losses and the handling of it were queried. Further attitudes on the issue of food losses and prospective approaches were collected. In total, 413 companies in the German food sector were invited via email to participate, and 51 companies (response rate of 12.35%) completed the questionnaire.

The data were entered into a statistical analysis software and then evaluated by univariate and bivariate analysis methods. The univariate analysis examines single variables and presents them based on absolute and relative frequencies. Bivariate analysis methods investigate coherences between two or more variables. The presentation is done by cross tables or comparison of mean values (Backhaus et al., 2011; Kuß and Eisend, 2010; Berekoven et al., 2009; Koch, 2009). In cross tables, combinations of two or more variables were opposed in a matrix and the abundance of the appearance of single combination possibilities was indicated in a matrix. Correlations between variables can be examined by chi-squared tests, to verify whether the correlation occurs accidental or can be transferred to the whole sample (Backhaus et al., 2011). Problems arise with low number of examined cases. The chi-squared test should not be applied, if cells exist in less than five cases (Janssen and Laatz, 2010). Due to the small sample size, the point of Janssen and Laatz (2010) is applicable at the investigation of differences between various branches. Therefore the study has rather an explorative character and the p-value is neglected. That fact is taken into account in the discussion and recommended actions.

2.2. Sample description

The present study was conducted with 51 companies of the German food industry. In total 413 leading companies of the food industry were invited to participate. Especially due to difficulties arising from company surveys like a low willingness to participate,