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Investigating the role of institutional frameworks in food waste reduction at the retailer interface in the European Union

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Abstract: The role of institutional frameworks in curbing and preventing food wastage cannot be overstated. Recently, policy makers have increased their interest in helping supply chain actors to reduce food waste by initiating policies at national and local level, but also opened questions on how such initiatives are affecting supply chain actors' practices towards sustainable food supply chains. Based on this concern, this study set out to investigate the role institutional frameworks have to play in tackling the problem of food wastage at the retailer-supplier interface within the European Union (EU). To this end, the study mainly focuses on the issue of food wastage in France by taking a look at the impact of the French food waste law on the retail-supplier activities and relationship.

This qualitative study underlines that the French food waste law has led to initiatives that are promoting circular economy and closed loop food supply chain, though the policies are being limited by behavioural aspects of actors along the food supply chains. Therefore, this research calls for a better understanding of behaviour of actors and collaboration along the supply chain through the use of information technology to have a full positive impact of the policy interventions towards sustainable production and distribution of food.

Keywords: Food waste, institutional framework, closed loop supply chains, food, supply chain sustainability, circular economy, behavioural aspects.

1 Introduction and Theoretical background

The extent of food waste in the world is a call of concern both at European and global level, that's why it has received high consideration across different disciplines, policymakers and institutions. In the past decades, food supply chains have become globalised and thus longer. Actors along the supply chain design their activities to satisfying consumers with quality products while minimising overall cost and waste. Despite efforts to optimise food supply chains, current research shows that food waste remains unacceptably high along the food supply chains.

The research in food supply chain production and distribution has been conscientiously investigating the quantification, causes and recovery of food waste; for instance, Parfitt et al. [1] focus on the quantification and causes of food waste across all supply chains worldwide. Other authors focus on food waste on a particular region, country or sector, such as Teller et al. [2] who focus on western Europe food retail. However, the studies do not focus on retailers influence on food waste across the food supply chains and how the macro environment can play a role in helping actors achieve closed loop supply chain. Since retailers play a pivotal role to link the upstream and downstream sides in a supply chain, they have a significant influence on food waste generation across the supply chain [3].

Therefore, focusing on the retail and their link to the upstream side of the supply chain and the role regulations play to prevent and reduce retail interface food waste justified the study. The study took a general outlook at the state of the art of various intervention in the EU and then narrowed to how the French food-waste law is impacting food supply chain actors in France. Therefore, the study aims to answer the research question: *How is the French food waste law impacting the retailer-supplier activities and relationship towards sustainable food production and distribution?*

When we take a look at factors of food waste, they can be divided into two, those that occur along the supply chain and factors from the surroundings of the food supply chain [4]. Elements that occur along the supply chain are mostly due to decisions and actions taken by managers and staffs. Factors from the surrounding of the food supply chain can include natural constraints and megatrends in the industry [5], including government regulations.

In 2012, 460 million tons of food went to waste at the retail level in the EU [6]. Several studies suggest that the food wasted at the retail level is still fit for human consumption yet 795 million people are undernourished mostly in developing countries as per FAO data of the period 2014 to 2016 [7]. Besides the food security problem contribution of food waste, it also contributes to environmental impact. 170 million tons of CO₂ is estimated to be produced along food supply chains in the EU [4]. Food waste also hurts the performance of food supply chains as it leads to financial losses and reputation issues thus sustainability issues.

Retail stores play a vital pivot role as they are gatekeepers who act as a link to other actors in the chain. In Europe, the food retail sector holds the largest market share and therefore dominant position that has triggered a change in food market structure where power has shifted from food suppliers to food retailers [8]. In the EU, direct retail sales to consumers on agricultural products are estimated at 54% of total sales while farmers account for only 2% [9]. Example, according to Statista [10], in France, E.Leclerc holds the largest grocery market share of 21.6% making it the most extensive and dominant supermarket in France, followed by Carrefour with 19.8% share. The waste generated at the retail level seems to be lower than other stages of the supply chain. However, retailers' measures to reduce food waste are at the expense of other actors on the supply chain who end up bearing the economic and moral burden of waste as a consequence of retailers' market power through activities such as take back agreements [11].

However, the European Union (EU) is against the practices that lead to disproportionate retail power. Suppliers are expected to report any misuse of power. However, such cases are rarely reported and are also difficult to prove. 87% of the EU

suppliers fear to raise their concerns to retailers, and they do not report either, 65% of them stated they fear retaliation [12].

EU parliament and member state governments have come up with policies and procedures to help food supply chains to be more efficient. Each policy initiative based on a specific approach. According to [13], policy approaches are classified as suasive or regulatory and targeted either towards the market or public, as shown in Figure 1. A suasive approach is a policy approach that aims towards behavioural changes through the provision of information, while a regulatory approach uses penalties where public authorities mandate performance to be achieved [13].

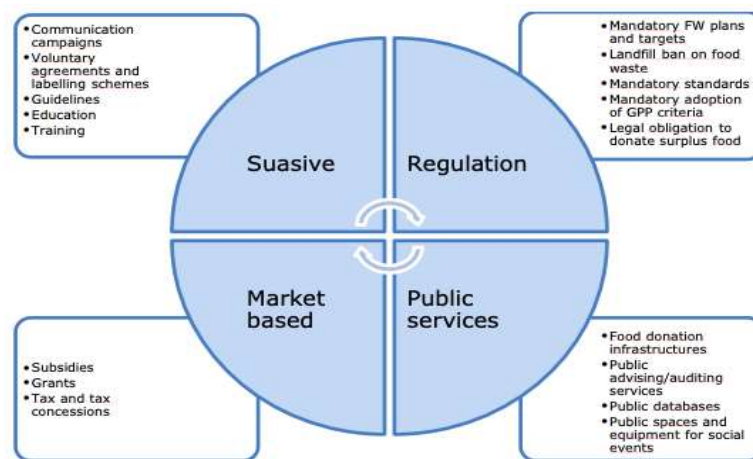


Fig. 1. FUSIONS classification approach for the policy measures. Source: [13, p.22].

The EU initiatives in regards to food waste are the EU circular economy that targets to reduce food waste by 30% in 2025 and 50% by 2050 [14]. Eu waste directive encourages its members to create programmes that prevent waste by concentrating on significant environmental impacts and keeping in mind the product life cycle [15].

The government of France in 2016 initiated a law [16] (i.e., LOI n° 2016-138) that required supermarkets that have a floor space exceeding 400m² to collaborate with charities in-order to donate surplus food within 48 hours before expiry [17]. A law was also passed in 2012, forcing the private sector to recycle organic waste. In 2020 the government extended the 2016 food waste policy to wholesalers with an annual turnover of 50 million EUR. In Italy, there is the Good Samaritan Law (i.e., Law n. 155/2003) that is in charge of ensuring charities that collect the food are responsible for proper storage and expiry date [18]. Further, Italy introduced in 2016 the PINPAS law (i.e., Legge 19 Agosto 2016, n. 166), which gives food supply chain actors flexible ways to donate the food to charities and food bank with a tax incentive; however, there is not a penalty [18].

Despite many different approaches, there is still limited knowledge of the impact of these regulations on food supply chain actors. Few researchers have conducted a comparison of the various law among countries such as [14] studies the role of the food

waste hierarchy in addressing policy and research by comparing the French and Italian food waste policies. [19] discusses the implication of the EU policies and legislation on food waste. The studies, however, do not cover the impact of this legislation on the activities and relationship of the supply chain actors. This study, thus, aimed to investigate this gap.

2 Methodology

To answer the research question, qualitative research method was used in this study because it makes possible the explanation of the relationships, variations, contextual factors, and norms prevalent at the retailer-supplier interface of the food supply chain. Since this study focused on understanding relationship phenomena and how the law impacts them, semi-structured interviews were used because open-ended questions and probing are best suited to help the researcher get an in-depth knowledge of aspects. Another importance of qualitative surveys is the richness of the data collected, the possibility of coding in a logical way, and the possibility of interpretation of data in a reliable way [20]. The semi-structured interviews deployed in the course of this study were limited to retailers and suppliers in France. Limiting the focus to France is because of the narrow investigation area for the study settled on France.

The study took an exploratory approach. Multiple embedded case studies are used to help understand the impact of French food waste law on the retailer supplier activities and relationship since its initiation in 2016. Following the advice of [21], the study accounts for construct validity, internal validity, external validity, and reliability throughout the research process. Key informants (i.e., managers) from the supply chain and logistic departments were interviewed face to face and through skype because they have the in-depth data of the processes in the company. Based on their responses, further questions were asked to them until sufficient data was collected. Total interviews conducted were eight from five companies.

A systematic and rigorous analysis was conducted through interpretative phenomenological analysis and text interpretation. The main themes coded on both the supplier and retailer interview guide. Coding was done manually as the number of the interviews allowed it. The process helped in identifying broad issues and patterns. A visualised table of the grouped data from suppliers and retailer was created for in-depth analysis to answer the research question.

3 Findings

The study highlights a novel of contribution on how the law enforced on food supply chain is impacting sustainability and points of improvements on the laws targeting supply chain actors' activities thus filling the research gap on impacts of regulations. The study found out that the French food waste law has led to the development of new business models that help in the redistribution of close to Date Limit Consumption (DLCs) food to consumers, and thus, closed loop food supply chains. The new businesses are helping in the redistribution of surplus food by ensuring the food

circulate within the economy and reach large masses of individuals thus minimal wastage.

These new businesses have also helped reduce the power retailers had in the market; however, retailers still have power. Because of the reduced power, suppliers can negotiate better deals than before. The law has also increased the awareness of food waste across the supply chain, and now actors can discuss this subject, and some have initiated green programs aimed towards circular supply chain such as conversion of unsold products into animal feed.

The study further found out that retailers have now increased the pressure to suppliers to be able to produce with the highest DLCs in order to improve the potential of them having less unsold food, this is because the law reduced 48 hours in which they could still sale these products and the retailers have no logistical cost support. With the increased pressure at the supply side, this has increased the amount of waste on their side since they have to meet the quality standards of retailers in the shortest time as possible. Therefore, despite the increased awareness along the supply chain, the law fails to address the problem of overproduction. Further, the supplier indicated that France has a lot of product references and shorter DLCs, due to this contrast, food is waste.

Table 1. Benefits and existing limitations of the law.

BENEFITS	LIMITATIONS
Increased awarness among actors along the supply chain. Actors can now discuss the subject of food waste	The law does not take into consideration the influence of retailers in the market and how the retailers' reaction to the law might impact the other actors along supply chain.
The law has led to the development of New business models that are providing a new channel of redistribution for the suppliers or retailers.	The law doesn't take into consideration the product life cycle. The high number of food references in France contradicts the aim of the law to reduce food waste. High number of references leads to overproduction and thus food waste
Increased quantity and quality of donations to the food banks and charities and thus less edible food going to waste.	No stringent quality checks of the food donated as some of the food donated in the food banks are passed expiry date.
Due to the development of the new business models, the power of retailers has reduced but the retailers still have the power in the food supply chain	Lack of logistic cost support to retailers

Though the French Food waste law may not be an applicable model to all countries, it is clear that the law plays a vital role in helping the supply chain actors reduce food waste and thus foster sustainability through circular economy. Each country has to impose policy based on the sector that has a significant influence on the supply chain and taking into consideration the behaviour and interest of the supply chain actors. Tackling food waste needs a system-wide approach that enables behavioural change and collaboration among the actors along the supply chain.

Table 1 summarizes the benefits and existing limitations of the law.

4 Discussion

To understand the complexity of food waste occurring at different stages of the supply chain, both analysis of food waste along supply chains and the policy intervention suggestions should go beyond individualistic accounts of one actor in the supply chain.

The discussion is presented by answering the research question by outlining various themes that emerged. These themes are discussed by the use of theoretical lenses of agency theory and social exchange theory to help understand the findings. Eisenhardt [22] defines Agency theory as organization relationships that involve a principal and an agent who engage in cooperative behaviour, though with differing goals and attitudes toward risk. Social Exchange Theory (SET) is argued by [23] as a theory that provides insights on social phenomena related to social interactions in a business environment.

In this study, the principal is the retailer, the environment factor is the government that creates the legislation, and the agent is the supplier. The unit of analysis is the French food waste law impact at the retailer-supplier interface. The French food waste law is regulatory and market-based as it provides a penalty if not followed. The government expects the retailers to donate the food nearing expiry within 48 hours before the date limit consumption (DLC), and this leads to a difference in agreement in priorities and methods. Retailers aims are to increase profits and reduce costs; however, redistributing to donation centres increases their logistic costs. The differing goals and objects among the actors have pushed retailers to increase pressure on their suppliers to provide products with the highest DLC according to the study findings.

Eisenhardt [22] indicates that organizations have an uncertain future and when environmental effects such as governmental regulation occur, they affect the outcome as they are viewed as risks. Therefore, outcome uncertainty and unwillingness to accept risk affect the contracts between the agent and the principal [22]. The study finding affirms this assumption of agency theory; we see that retailers have increased pressure on suppliers to be able to produce and distribute to them (retailers) with the highest DLC to reduce their risk of penalties due to waste. This behaviour further, affirms agency theory contribution of risk implications, where the risk-averse principal will push the risk to the agent.

Despite the increased pressure by retailers, suppliers are working to ensure they meet the retailers demand to be able to produce and distribute at the highest DLCs as they fear retailers' retaliation. A study conducted by Devin & Richards [11] also found out that suppliers did not report the misuse of power by retailers even when systems to help the suppliers were in place. The reciprocity behaviour by suppliers affirms SET premise that seeking rewards and avoiding punishment is the primary motivation for interaction among parties in social exchange [24].

The increased pressure by retailers to suppliers is due to coercive power, where suppliers have to give in the demands of the retailers' or they will risk renegotiation of contracts, or another supplier who can meet this demand is selected. The power imbalance between retailers and suppliers in the food supply chain, especially in Europe is because the point of sale is mostly at the retail stores [12]. However, the study found out that retail power has been reduced by the new business models that cropped up as the result of the law.

The new businesses have also resolved the challenge of take-back agreements that lead to increased food waste at the supplier side, this new business has offered a channel for suppliers to sale their products returned from retailers. Moreover, to some extent, solved the challenge of costly shelf space at retail stores that limited the amounts of products suppliers could display. Furthermore, these new business models have provided the traditional supply chain actors with a channel through which they can redistribute their surplus food to the consumers.

The agency costs incurred by the government in order to reduce food waste has born fruits of increased awareness of food waste among actors. Agency cost is the cost that arises from agents misusing their position and the cost of trying to discipline and monitoring them to ensure they do what is expected [22]. Example of evidence of improved awareness among actors in the supply chain is the Carrefour and other supermarkets initiative in France. Carrefour extends the use before dates to avoid the confusion that it creates to customers, who think it is an expiry date, example yoghurt best before date was extended from 7 days to 10 days with no changes to quality or ingredient [25].

Supply chain actors along the food supply chains tend to focus on internal waste reduction this result to sub-optimal results on the entire supply chain [5]. Though the new business structures are helping in the redistribution of the surplus food along the supply chain, supply chain actors such as retailer and suppliers should work to enforce strong collaborations. For the French food waste to have full effect on food reduction, collaboration among retailers and suppliers is called for, as a collaboration among actors will lead to a compromise of self-interest, improve product imbalance and thus optimal result along the supply chain. The collaboration will also help solve the underlying problem of overproduction that leads to food waste and technological solutions such as Artificial Intelligence can be put in place to connect both the supplier and the retailer data centers to be able to collect real time data that helps in accurate demand forecasting and thus solve the problem of overproduction.

Figure 2 shows a model framework of the impact of the French Food waste law on the relationship between the suppliers and retailers based on Social Exchange Theory (SET) and Agency Theory (AT). The figure is a pictorial representation of what has been discussed in section 4.

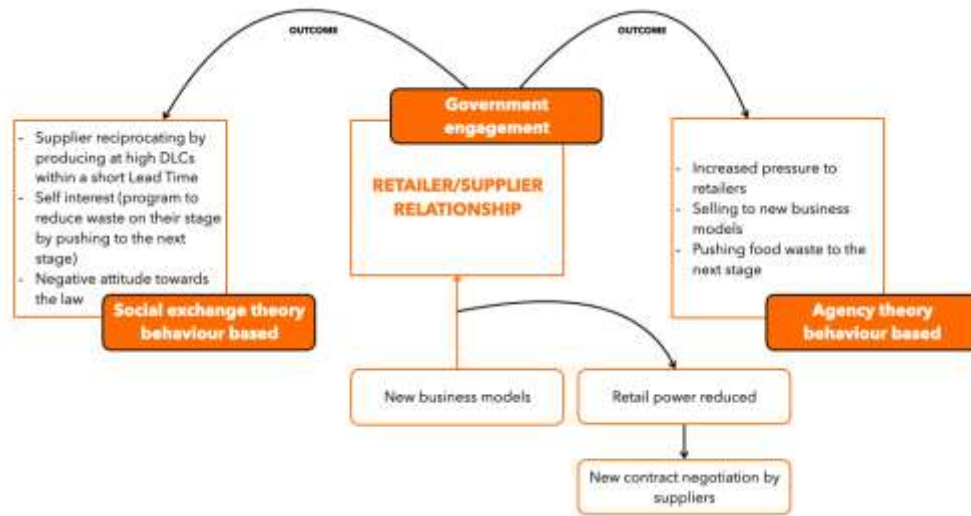


Fig.2. Model of French Food waste impact on Supplier relationship based on SET and AT.

5 Relevance and contribution

5.1 Theoretical Implications

The study adds to the several investigations carried out on food waste along the supply chain by filling the research gap of the impact of the regulations on supply chain sustainability. This study provided insights on the effectiveness of the regulations introduced in the supply chain to help actors reduce food waste.

It also contributes to supporting Giordano et al [14] study, where the author reviewed the laws and compared the French and Italian law. This study provides a primary data collection from some of the actors in France and provides insights on the impact of the French Food waste law from a primary data point of view. Further, the study helped to support the agency theory and the social exchange theory premises and how they are critical when it comes to decision making that involves the interaction of actors along the supply chain.

This study further contributes to enhancing the understanding of close loop and sustainable supply chain, where food is reused and redistributed through new business structures and not for profit organization. This also contributes to supplier retailer relationship and how supply chain power can be reduced in the food supply chains in Europe if more players with different structure enter the market, thus fostering collaboration along the supply chains.

5.2 Managerial implications

The findings suggest that despite organizations having a transactional relationship with their partners along the supply chain, it is essential that managers learn how to mitigate behavioral uncertainty along the supply chain. Managers should bear in mind how supply chain actors respond to transactional costs dilemmas which leads to abnormal behaviour. Therefore, managers must analyze their partners' behaviour and be prepared with counterbalancing remedies which might help in creating a business environment with a trusting atmosphere and reduce the negative impacts of behavioral interests.

Managers should take into account the agency theory and social exchange theory to be able to factor social, economic, and behavioral aspects when entering into contract decision making. Managers should also bear in mind that regulations that come in place in the market to help in the fight against food waste along the supply chain might not work for all supply chain actors. Therefore, managers need to leverage supply chain collaboration with their partners to be able to be effective and sustainable.

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