Impact of the Customers' and Governments' Demands on Complex Food Supply Chains

Alexandra Ioana IONESCU FLOREA[1]
Răzvan-Andrei CORBOȘ[2]

ABSTRACT
Food crisis are always of big concern for the consumers and governments. Complex supply chains make it more difficult for all actors involved to manage such a crisis. Companies in the food industry must respond now not only to the concerns of customers about the food safety, but also to their need for fresh and healthy products. Together with governments, to enforce regularly the legislation, customers affect the way food actors conduct their business, and can have a great impact on the food supply chain. In order to answer these needs, companies have to modify their supply chains and operate with more transparency, taking into account the demands for traceability. The objective of this article is to analyze how customers and governments trigger more transparency from the food companies and supply chains, the opportunities and challenges of implementing and communicating transparency and traceability.

KEYWORDS: *food supply chain, traceability, transparency, food security, food safety, health and wellness.*

JEL CLASSIFICATION: *M11.*

1. INTRODUCTION

No longer than 3 years ago a major food crisis occurred in Europe. Big companies like Tesco, Aldi and Findus sold horse meat labeled as beef. Although the products were not dangerous, as the meat was eatable, these companies were more than embarrassed by the fact that clients did not received what was labeled. This happened because of the complex supply chain that made that the horse meat, apparently slaughtered in Romania, went through a lot of intermediaries, travelled across continent to France, than to Luxembourg, before getting to the countries it was consumed in (The Economist, 2013). According to the same article, a former head of food authenticity at Britain's Food Standards Agency, Mark Woolfe declared in the same context: "The more complex the food chain, the more difficult it is to control".
After each food scandal, regulations are reinforced and all actors across the food supply chain need to improve their way of conducting the activity. Food is safer in the developed countries than it was a century ago, shows the article from the Economist mentioned above, as food poisoning is no longer among the main causes of death nowadays. Still, a 2015 publication by the reinsurance company Swiss Re finds that the number of food recalls per year in the US has almost doubled since 2002 and nearly 9 million Americans became sick from contaminated food in 2013 alone. The affected companies lost more than USD 10 million. The risk management for food recalls is made more difficult because of the globalised food supply chain.
But consumers, apart from the food being safe, are more and more interested in fresh, natural and minimally processed foods, according to a Nielsen report (2015). This trend has two implications for the companies in the food industry: modified supply chains and transparency. This article aims at analyzing the implications of new consumption patterns on supply chains in the food industry. The research will be based on academic articles, industry white papers,

[1] Bucharest University of Economic Studies, Romania, sandraionescu@hotmail.com
[2] Bucharest University of Economic Studies, Romania, razvan.corbos@man.ase.ro

information from specialized industry websites, customer surveys. We will also analyze how transparency can be implemented along the supply chain, opportunities and challenges. Also, this article will point out the fact that governments are the other factor that leads to change, through the legislation they set out.

2. NEW EXPECTATIONS FROM CUSTOMERS

Food plays an important role in our lives. Not only it gives us energy to live and do all sorts of activities but it also contributes to our health. Starting from childhood, our parents try to convince us to eat carrots not only because they are tasty, but because they can help our view, or spinach, because it will give us strength. Growing older, we find everywhere around us information on how each aliment or ingredient can contribute to our well-being and health. Many times, these pieces of information are endorsed by medical research, which clearly convince us that we need to pay better attention to what we feed our stomach. Medical research also warns us of dangers that some aliments present to our health.

International research companies have already conducted studies in order to see more clearly what customers think about this information and, more importantly, how do they act on it. An important study in this field is done by the International Food Information Council (IFIC) Foundation every two to three years since 1998. This foundation aims to effectively communicate science-based information on health, nutrition and food safety for the public good. Their 2013 study shows that 90% of consumers agree that certain foods have health benefits beyond basic nutrition, the percentage having risen since 2002. This means that almost all consumers are now aware of the healthy advantages brought by food.

The survey also shows that consumers are interested in learning more about functional foods, as almost nine in ten Americans want to learn more about foods that have health benefits beyond basic nutrition. Another aspect covered by the survey is the fact that three out of four consumers report concerns that they are not getting enough nutrients for a good health. Concerning the processed foods, most consumers agree that they are more convenient and last longer. However, very few consumers believe that processed foods are safer or more nutritious than foods that are not processed.

Another survey conducted by the same IFIC in 2015 shows that the Americans' confidence in the safety of the US food supply has decreased from 78% in 2012 to 61%. The most important food safety issues are chemicals in food and foodborne illness from bacteria. Other issues considered when shopping for food are chemicals in food or packaging, pesticide residues in fruits and vegetables and animal antibiotics.

The Nielsen study we mentioned earlier brings new insight on the way consumer act today regarding food. Half of global respondents believe they are overweight and half are trying to lose weight. They intend to do that by doing physical exercise and changing the diet. In this way, besides cutting down on fats and sugar based aliments, consumers intend to eat more natural, fresh foods and fewer processed foods. Also, whether trying to lose weight or not, consumers are interested in functional foods that provide benefits that either reduce the risk of disease or promote good health. They are also concerned about environmental and socioeconomic problems, as one third take into account the sustainably sourced and organic ingredients when making a purchase and more than one quarter are interested in local herbs/ingredients.

Concerning the supply chains and the fact that a lot of food products are harvested or manufactured in other countries than those of consuming, a survey conducted by the government of the United Kingdom shows that people are more concerned in terms of safety about the products imported from outside the UK, than about those produced in the UK.

Another interesting survey was made by the international consulting company Trace One, an agency that connects retailers, manufacturers and suppliers with the aim to accelerate product innovation and create supply chain transparency. Chris Morrison, Chief Marketing Officer at Trace One presents the results of a survey they conducted in 2015 on the trust people have in the quality and safety of the food they consume. Here are the main findings: (1) trust in food safety and quality is declining and customers are demanding more information about the origins and ingredients of their food; (2) a great percentage of people think that it is important to know where their food comes from, but they believe they do not receive enough information about what the food contains and its provenance; (3) many people hold the manufacturers and retailers responsible for food quality and safety; (4) consumers demand more transparency about where the food is coming from.

3. INTERNATIONAL REGULATIONS FRAMEWORK

The need for safe food products has led the governments to adopt and implement specific regulations in this field. But traceability legislation is not the same in every country, as seen in a report published by Comprehensive Reviews in Food Science and Food Safety in 2014. Europe was the only area where food traceability practices were found to be 'Superior', and overall scores of 'Average' were given to Australia, Canada, Japan, Brazil, New Zealand and United States. The ranking received by China was 'Poor' and the Russian Federation was not ranked, because of insufficient data. One of the authors of the report, Brian Sterling, finds that it's imperative that traceability requirements and regulations be harmonized across countries, because the complexity of following food through a global supply chain makes the process slow and inefficient in times of crisis.

The European Union adopted in 2002 the Regulation (EC) No 178/2002 covering the general principles and requirements of food law (General Food Law Regulation). This law sets out a framework for developing the food and feed legislation both at Union and national levels. It contains principles, requirements and procedures, covering all stages of food and feed production and distribution. This law helped create an agency responsible for scientific advice and support, the European Food Safety Authority (EFSA) and the Rapid Alert System for Food and Feed (RASFF), containing the tools and procedures for the management of emergencies and crises. The general objectives of food and feed law are: guarantee the protection of human life and health, of the consumers' interest, and of fair practices in food trade; implement free movement of food and feed in the UE; facilitate global trade of food and feed. The law sets on three principles: risk analysis principle, precautionary principle and transparency. The food law general requirements refer to safety and traceability.

According to EU legislation, traceability means the ability to track any food, feed, food-producing animal or substance that will be used for consumption, through all stages of production, processing and distribution. Traceability is needed in order to ensure that all food products are safe, to trace back any identified risk and prevent contaminated products from reaching customers, and to accurately inform the public. In Europe, such legislation is necessary because of the free circulation of food and feed across countries.

The 2002 General Food Law makes traceability compulsory and requires that operators implement special systems, in order to be able to identify where the products have come from and where they are going. Guidelines were published, requiring business operators to document the names and addresses of the supplier and customer in every case, as well as the nature of the product and date of delivery. The law also sets out specific requirements as in the case of certain categories like fruit and vegetable, beef and others, in order for the consumers to identify their origin and authenticity and in the case of genetically modified organisms (GMOs). New rules were introduced for animals also, which have to be tagged

with details of their origin and be stamped when taken to slaughter. Also, the law establishes clear responsibilities for each party at stake, food and feed businesses, member states authorities and the EU, and actions to be taken when a risk is identified.
In the United States, the situation is more complex as several government agencies have regulatory control over different aspects of fresh food and production, processing and distribution of food products. According to Wikipedia, these include the US Department of Agriculture, the US Food and Drug Administration (FDA) and the Centers for Disease Control. For example, the US Department of Agriculture regulates meat, poultry and egg products (Nachay, 2011). In terms of traceability, the FDA Food Safety Modernization Act (FSMA), enacted in 2011, establishes regulations requiring that food facilities register with FDA and FDA be given advance notice on shipments of imported food. The FSMA included provision that expand the authority of FDA, such mandatory recall authority, the responsibility to develop a third/party audit system for the certification of imported foods, increasing the frequency of mandatory inspections, developing regulations for preventive control plans, establishing a products tracing system. One of the objectives of this act was to improve traceability within the US food supply but the work is far from complete, as seen by Nachay (2011).
The situation in other countries around the globe is described by the Comprehensive Reviews in Food Science and Food Safety report: Japan has regulations on beef labeling for farm-to-fork traceability and rice and other various commodities traceability; in Canada only livestock tracking is mandatory; Australia, New Zealand and Brazil have strong livestock identification and traceability systems; traceability is largely unregulated in China.

4. IMPLICATIONS ON SUPPLY CHAINS

We have seen during the previous chapters that the companies in the food industry have to respond to the requirements of two different types of actors: the customers and the governments. In fact, considering that the governments respond also to the desires and needs of the people and adapt the legislation accordingly, it is the final clients, those that buy and consume the food products, who trigger changes in the way companies must do business. As no longer the customer demand impacts the production forecasts, and the supply chain can be also affected by this, variation in the supply demand is often cause of concern for the managers (Khan et al., 2014).
The customers require on one hand safe, fresh and healthy food, and on the other hand, more information about the products. This translates, from a logistic point of view, into modified supply chains and more transparency. We will analyze accordingly each aspect, the implications on the activity and how companies react to these expectations.
According to Marucheck et al. (2011), operations management can provide fresh and effective approaches to managing product safety and security, although this has traditionally been regarded as a technical problem in the field of governments and scientists. It is important for the company to increase the exchange of information about characteristics of products, processes and resources between stakeholders in a food supply chain (Trienekens et al., 2012).
According to a Deloitte report (2015) the food value chain is the network of stakeholders involved in growing, processing, and selling the food that consumers eat, from farm to table and these stakeholders are: the producers, the processors, the distributors, the consumers and the governments, each of them having a specific role, as shown in the table 1.

Table 1. Stakeholders of the food value chain

Stakeholder	1.Producers	2.Processors	3.Distributors	4.Consumers
Role	• Research and development • Farming • Ranching • Trading	• Harvesting • Butchering • Processing • Value add processing • Manufacturing • Marketing and sales	• Distributing • Retailing	• Shopping • Consuming
Key issues	• Management capabilities • Strategy • Financial issues	• Strategy • Achieving scale • Supply chain strategy	• Strategy • Supply chain strategy	• Food prices • Food security • Food safety • Health and wellness

Stakeholder	5.Governments/NGOs/Regulators
Role	• Public health and safety • Public policy
Key issues	• Food and product safety • Security • Policy and support

Source: Deloitte (2015, p.3)

The Deloitte report explains the challenges encountered by each stakeholder. As the producers are generally small farming businesses, they must enhance efficiency, be aware of the market volatility, reduce the working capital strain due to the long cash cycle, and put emphasis on innovation. The processors, taking care of the preparation of fresh products and of the production of prepared food, must adapt by means of innovation that supports growth, run their business at a globalized scale, insure a secure and safe supply chain, use energy with efficiency and improve waste management. The retailers and distributors, acting on a very competitive market, must deliver high quality products, manage the complexity of multiple channels and formats, and be aware of the growing importance of the e-commerce channel and of the evolution of packaging. Consumers are concerned about food security and high food prices, are more aware about problems related to obesity, health and wellness, and have growing concerns over food safety. The regulators must take into consideration the changing trade relationships between importing and exporting nations, the increasing strains on food safety and agro/bio-terrorism infrastructure, and rising global farm land acquisition.

In the U.S., the food supply chain is even more stretched according to a report by SGS (2013), as food passes through no less than five chains in order to get to the consumer: farmers and producers, manufacturers and processors, wholesalers and distributors, food service vendors, retailers. A total of 3 million stakeholders on the entire supply chain generate $1 trillion in US consumer sales (Table 2).

This entire chain of actors must lead to the commercialization of a product that must be accepted by the end customer. According to Trienekens et al. (2012), especially in the food industry, a supply chain is as strong as its weakest member, thus the activities of all actors should be closely coordinated, each of them having their own role in assuring quality and safety of the end product.

Table 2. US food supply chain

Basic US food supply chain statistics					
	Farmers and producers	Manufacturers and processor	Wholesalers and distributors	Food service vendors	Retailers
Number of entities	> 2.1 million	> 26,000	> 33,000	> 580,000	> 210,000
Sales revenue	$375 billion	$540 billion	$600 billion	$580 billion	$548 billion
Structure	125,000 farms control 75% of the sector	100 firms control 75% of the sector	50 firms control 50 of the sector	3 companies control most foodservice management companies*	20 firms control 60% of the sector

* Foodservice management contracts exist between private catering providers and public and private institutions such as hospitals, colleges and military establishments.

Source: SGS (2013, p. 4), Pullman & Wu (2012)

Companies react in the following manners at the food safety concerns: (1) they extend their assortment by product and brands that are associated with safety and quality; (2) they claim their integrity with respect to food safety and quality in communication to stakeholders; (3) they formally register their performance, in order to underpin their integrity claims; (4) they establish both organizational and technical systems to communicate internally and mutually about their quality performance, in order to improve it with quality control systems and tracking and tracing systems (Beulens et al., 2005).

Modern consumers are not only interested in safe and healthy products, but they require guarantees for food characteristics, thus calling for transparency (Trienekens et al., 2012). All these new demands from customers and government are drivers for innovation and companies must implement systems to improve the product's quality and to guarantee its safety, as the same time making transparent that they do so on the level of the supply chain (Beulens et al., 2005).

In food business, transparency can respond to several needs of the company: improving market efficiency, enhancing the information exchange all along the supply chain, delivering better food quality, optimizing the logistics and the processes (Trienekens et al., 2012).

In order to design and realize all aspects related to transparency and food safety, companies take into account three aspects: functionality, transparent information, infrastructure and connectivity (Beulens et al., 2005) Functionality means that the company must not only generate the quality required, but also to optimize the business processes and mainly the logistic and recall processes that are necessary in case of calamity. Also, it means providing information required by stakeholders in and out the supply chain network and satisfying reporting requirements imposed by rules and regulations. The transparent information regards the useful data shared by all partners in the system, and needs to be communicated through a connected infrastructure.

According to Trienekens et al. (2012), the food industry has four motivations for transparency: (1) companies need to comply with demands from consumers as well as legislative demands, (2) when incidents appear, companies are required and want to be able to quickly recall products from markets, (3) by improving information exchange through integrated information systems, optimization of business processes will be much easier as product and process attributes can be coupled with process performance, and (4) value can be added by labeling products according to distinguishing intrinsic and extrinsic food product attributes.

A research realized by MIT Center for Transportation & Logistics (2015) presents three ways in which a more transparent supply chain can become a benefit to companies: (1) transparency helps organizations meet demands for responsible practices, companies can inform consumers about their products and reinforce the integrity of their operations with verifiable data; (2) transparent supply chains reduce risk by ensuring supply, improving vendor relationships, and facilitating effective risk management; (3) the costs of traceability initiatives often may be offset by operational efficiencies companies can gain from a closer look at their supply chains. According to the same paper, technological innovations can be used to reach traceability goals, like genetic food markers, RFID tags, and mobile phone compatible bar codes.

There are two dimensions of transparency, as shown by Wognum et al. (2011): labeling supports the horizontal dimension and traceability is part of the vertical dimension. As we have seen from the previous chapter, labeling and traceability are governed by different laws around the world, which make them sometimes compulsory. But, either obliged or not, companies can use these tools in order to successfully implement transparency. The challenge comes from the fact that all actors across the supply chain must comply, and this can be done through integrated or highly coordinated supply chain, in which all actors have agreed to the use of specific standards and systems (Wognum et al., 2011).

We have seen earlier that supply chains, especially in the food industry, are stretched and made of a long chain of actors. Thus, they can be affected by all sorts of risks like: risks associated with suppliers, risks associated with transport, risks associated with warehousing, risks associated with production and risks associated with marketing (Florian & Constangioara, 2014). Wognum et al. (2011) present a list of barriers to traceability in food supply chains: complex products make it difficult to follow the different raw materials that go into its production; variability exists in quantity and quality of raw materials and intermediate products; contamination occurs because of different batches of raw materials; identification differs between batch and continuous production; the number of sources of batches of raw materials increases; the number of actors with formal and informal relationships in the supply chain may be large; connections between physical and administrative product flows are often lacking; food products may be based on variable or multi-level recipes; rework is needed in liquid products processing; food products often contain active material; food products are perishable.

4. CONCLUSIONS

In this paper we have analyzed the demands from customers and governments that lead companies to more transparency in their operations, and especially in their supply chain. Customers no longer want only safe food, but they are interested in fresh and healthy products. They are concerned about the functional benefits of the products and want more information on what the products contain and how they were fabricated. Governments enforce legislation after each big food crisis and are more and stricter in what concerns traceability and food labeling.

As all these demands come from different and many actors, companies must be able to respond to them. The food industry must also adapt to a multitudes of demands from the customers, which has lead to a great rise in the number and variety of products offered on the market. This puts great pressure on supply chains, that must adapt and deliver, and on the companies that must comply with the legislation and respond to customers' demands.

A more transparent supply chain can bring benefits to the company, but also challenges. The food industry has means for insuring transparency, through labeling and traceability, sustained by technological innovations as genetic food markers, RFID tags, and mobile phone

compatible bar codes. Still, this technology must be related into an information system that can cover not only operations within a company, but linking all companies on the entire supply chain. This is a subject that this article doesn't cover, and could represent a theme for further research.

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