



SUSTAINABLE FOOD SUPPLY CHAINS: CASE STUDIES EXAMPLES FOR SUSTAINABLE SUPPLY CHAIN (BEEF)

Kanan Amirov

*MSc. Food and Resource Economics and Management
University of Bonn
kanan.amirov@gmail.com*

Abstract

Up to date, importance of sustainability is increasing according to dynamics of markets. In course of time, consumers become more sensitive against daily food products in terms of organic products. Therefore, sustainability has essential role in the purchase decisions and development perspectives of different companies in food sector. Especially, production with environmental perspective is needed to be transparent in order to get progress in future activities of companies. Moreover, social and economical aspect of sustainability is also forced by government and non-government organization to be realized because of safety and fair trade in global market. On this purpose, it seems as a vital part of corporative strategies and requires much more attention today than in the past. In this paper, the description of sustainable supply chain of beef market will be characterized with case study of VION. Firstly, supply chain management is described with its key elements and the whole this process is defined at the beginning of paper. Then, sustainability will be portrayed in the terms of the environmental, social and economical aspect in beef industry. However, the environmental aspect of sustainability is described more detailed than others. The current situation of this market will be analyzed in South America because of its big share in global beef production. Finally, evaluation and conclusion of beef market and its real picture with all characteristics will be stated in the context of sustainability in VION. Official website of VION and several articles about sustainable supply chain management provide the main source for the paper.

Keywords: Case Study; Supply Chain Management; Sustainability

1. Introduction

The beef industry has a major role in food security in the global market. Due to this situation, *supply chain management* of beef production is required to be realized more *sustainable* in global area. Meat industry is usually controlled by the different national governments because of dominated role of “*household slaughtering*” and “*wet markets*” in global food safety. However, greater consumer assurance about the inspection of cattle slaughtering and beef distribution might be developed by the *sustainable industry* (BROWN AND WALDRON 2003). In beef production, it is obvious that sustainable supply chain management is related much more to the *environmental* aspect than *social* and *economic* aspects. Moreover, meat production is required to be transparent in the aspect of ecological (or environmental) against consumers. That is why, mostly environmental aspect of sustainability is needed to be analyzed and compared with the leader companies in the market (ALLGREEN 2012). In this paper, *sustainable supply chain* of South American beef market is described generally and all gained dates are used to make evaluation about situation in VION that is leading company in European market.

South America totally represents a global beef-production dominator with its comparative advantage in *low-cost beef production*. They are able raise beef at 35-50% less in terms of volume than North American costs of production. Brazil and Argentina are the leader South American beef producers that continue to use advantage of its low-price and low-cost production to occupy the large share of the *global beef market* (PECK 2008). However, other actors of this market such as Uruguay, Paraguay and Chile also have economic potential in international beef market (RODRIGUEZ 2007).

It has to be mentioned that for being capable beef producer it is really required to keep up the latest achievements in this industry. Therefore, it's vital always to take account the processes that others follow to improve their business. As mentioned above, South America is one of the world-standard beef producers with the low base cost and this issue makes it stronger than others (NAB 2005).

VION is a company that has market leadership in *fresh beef* with significant (7.4) percentage market share. This part of market was gained as result of acquiring a half part of stake in the Germany-based Südfleisch in 2007. The Irish Food Group and Cremonini are the second and the third largest beef processing firms with high (€1 billion) turnover according to statistical data of 2007. The competition in European beef market was accelerated with new entering of South American companies in 2007. For instance, the Brazil-origin JBS Swift owned INALCA that is beef Production Company of Cremonini in order to entirely concentrate on beef processing. Similarly, "the USA-based Smithfield Foods has divested all beef activities, selling their beef unit to JBS Swift for USD 565 million in cash in March 2008" (RADEMAKERS 2012).

2. Supply Chain Management of Beef Production (VION Study)

In the literature, the broad *definition of supply chain* was done by MENTZER et al. (2001) as "a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer" (MENTZER et al., 2001).

On the first scene, *Supply Chain Management* expresses the combination and management of strategic business units in the whole period from supplier to consumer. In this chain, the most of activities such as R&D, production, technical are done for making the product more convenient to consumers' preference. A strategy for *planning, implementing and controlling* as well as *processing, manufacturing, storage, packaging, transport, quality management* and finally *marketing and sales* all are critical to success (RAYMOND 2006).

In the global beef market, inputs and outputs of production are exchanged along transaction channels where cost and cattle weight are important factors to formulate beef price. The *beef supply chain* is divided into several parts. *Cow/calf operators, stocker operators, feedlot, packer and retailer* are the elements of beef supply chain. The whole picture of this chain is described in *Table 1*. The starting point of chain is ranchers like *cow/calf operators* that help to promote young calves. These calves receive mothers' milk and can be stated as *weaned*. On this purpose, the weaned calves usually graze on pasture and range land. The next element of chain is *stocker operators* that get weaned animals from ranchers in order to feed and increase their weight. This process is continued by selling grown calves to feedlot that provide fattened cattle to slaughter. Final beef product is made in the period of six to nine months weighing and cattle producers usually sell *livestock* through local or remote markets. *Video and internet* are used on selling process and *prices* are determined based on factors as weight, genetics, health, location and cost of completed product. (PULLMAN AND WU 2009).

Table 1: Beef Supply Chains

| Supply Chain Member | Traditional Beef Characteristics | Traditional Ownership | CNB Beef Characteristics | CNB Ownership |
|---------------------|---|-----------------------|---|--------------------------------|
| Cow/Calf Operator | Cattle graze on ranch for 12 months | Rancher | Cattle graze on ranch for 12 to 18 months | Rancher |
| Stocker Operator | Cattle graze or feed for 12 to 20 months | Operator | | Rancher |
| Feedlot | Cattle feed for 180 days on corn & grain (500 lb average gain) | Feedlot | Cattle feed for 90 days on potato waste; small amounts grain and corn (300 lb gain) | Rancher |
| Packer | Heavy cows and high fat marbling, unknown history | Packer | Lighter cows, lean meat, individual history on ear ID tag | Rancher |
| Retailer | Different quality characteristics desired depending on final retailer | Retailer | Healthy, natural beef with consistently lean characteristics | Rancher & Retailer Partnership |

Source: Pullman and Wu 2009, p.p. 29.

Flavor, tenderness and marbling are the main characteristics of meet and they are affected by diet. Dietary has three objects on this process: 1) *meat consistency* 2) *weight gain maximization*, and 3) *cost minimization*. Forage grains, corn and vegetables (as potatoes) are the examples of diets. Moreover, beef production can also be completed in open pastures and large enclosed lands as “bunkers”, “pens” of varying sizes that provide more space per cattle than regular feedlots. On the other hand, as the biggest part of production cost, farms have to pay more attention to feed and efficiency in it. However, the quality of pasture mostly depends on soil, terrain, rainfall and climate conditions of the land. Generally, farming of animals is connected to food safety, animal compassion and environmental arguments and it leads to more complex supply chains (PULLMAN AND WU 2009).

The *Fresh Meat* division of company VION is consists of processing of *pork, beef and lamb*. In this division, 6,447 persons were employed in 44 operating plants in 14 country offices all over the world and it had turnover of €5.4 billion in 2007. The Fresh Meat processing plants are widely situated in the *Netherlands and Germany*. The customer of this division are indicated as below; retailers (*Ahold, Wal-Mart, Aldi, Metro Group, Carrefour and Tesco*), food service companies (*Burger King and McDonald's*), and the branded food industry (including *Unilever and Nestlé*). The VION Fresh Meat operation is mainly concentrated on margin-cost growth in European (Such as Dutch, German and UK) markets, and expanded production range with export to Italy, France, Spain, Greece, Eastern European countries, the USA and countries in Asia (RADEMAKERS 2012, p.p. 157).

There are several factors that have key role to achieve a successful supply chain management as well as in beef market. These factors can be listed as strong communication strategy, information sharing and openness, aspirations to the ‘true worth’ of the product, trust, transparency, specifications, strict production protocol, *sustainability*, reliability by supply chain partners. They have interactions between each other’s and need to be realized together in order to gain sustainable development in the supply chain (RAYMOND 2006).

3. Sustainability in Beef Production (VION study)

Combining definitions of sustainability was defined by SEURING and MÜLLER as “the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements” (SEURING AND MÜLLER 2008, p.p. 2). Obviously,

members of the sustainable supply chain have to take account environmental and social criteria as well as equally economic criteria in order to remain competitive by meeting customer demands (SEURING et. al 2008).

When sustainability is applied to beef supply chain, then environmental aspect of sustainability becomes more remarkable than other aspect in terms of further development perspective of chain. The main reason for this is the strong interaction between beef productions and environment.

3.1 Environmental Aspect

Up to date, *ecological issues* oblige companies to take account this factor in their production process. Therefore, the big share of current companies attempt to get *ISO 14001* environmental certification through the support of a “public-private partnership”. One of the known retail supermarket chains in South America (Brazil), PÃO DE AÇÚCAR, launches a development program to determine and support small suppliers of sustainable Brazilian products in context of environmental issues (UN 2005).

Obviously, sustainability is the most common way to promote and increase social and environmental standards in production. Especially, beef producers have to realize the perception of many factors if they aim to build a successful *sustainable business*:

- Sustainable pasture management;
- Maintenance of biodiversity;
- Soil management;
- Air management;
- Water management (greenhouse gas emissions; offensive odors);
- Efficient use of other resources such as fuel;
- Good stock management, taking animal welfare into consideration;
- Responsible use of chemicals; (WALKER 2003).

Some of these factors play paramount important role in *beef industry*. For instance, Capper indicated that “It’s important to note that all food production has an environmental impact, but significant improvements in efficiency have clearly reduced the *greenhouse gas emissions* and overall *environmental* impact of beef production” (CLARK 2010). Nevertheless, the situation in South America is not satisfied in global level. For example, *Irish* beef production chains are at least twice more efficient than South American production in terms of *climate change and greenhouse gas emissions* (GHG). GHG emissions from imported Brazilian beef are estimated at up to 80kgs CO₂-eq/kg, (with land use changes LUC) and 48kgs CO₂-eq/kg, (without LUC). Generally, EU beef production is more *sustainable* regarding to efficient *carbon* and *water*; with greenhouse emissions from Irish sucker beef production calculated to be around 18/22kg CO₂-eq/kg meat (IRISH FARMERS’ ASSOCIATION 2011). In VION, water is planned to be efficiently used because of it takes lion’s share of production processes. The waste *water purification plants* system helps to clean the water for use in the production, and then only purified water is discharged to the surface water. On the second hand, VION acts social responsible in order to minimize own water usage, besides production of *sustainable fuels* and maintenance the *water quality*. For this reason, energy and water consumption patterns at production locations are regularly checked and optimized (VION 2012).

In the context of climate change, the growth in South American (usually Brazilian) beef exports ahas made remarkable damage on the Rainforest in the *Pantanal* and *Amazon* regions. Nowadays, this effect is required to be investigated more deeply and alternative energy sources should be involved in beef production (THE IRISH FARMERS’ ASSOCIATION 2011). As many other sources, energy also has crucial role in VION’s various production

processes, in both energy consumption and energy generation. *Ecoson* is one of VION Ingredients' operations, and it does production of sustainable *biofuels* and *biophosphate*. The main part of raw materials used on this purpose is animal slaughter byproducts. These biofuels are consumed as sources of energy for VION Ingredients' production processes and also to produce green electricity (VION 2012).

In sustainable beef industry, managing fertility takes essential part of *sustainable pasture management*. When *animals graze*, nutrients are converted to manure and again return to pastures. Therefore, continuous grazing systems have to be planned to distribute the manure more efficiently. Usually in grazing period, cattle congregate together at watering and other mineral feeding areas and shade in there. These shade areas can be used as nutrient sinks, too (ANON 1993). Typically, "*greenhouse effect*" and "*global warming*" from produced methane, the renewing of tropical field for cow/cattle pastures, degradation of cattle lands by incapable grazing management programs can also be analyzed in the aspect of social sustainability (CHEEKE 1993). VION has more production forces in Europe than before and due to the constricted feeding areas more attention was paid on animal grazing. Therefore, different production conditions in Europe and several treatments are exits on purpose of applying high level of *technology* in sustainable pasture management.

Normally, producers of beef products make investigation in productivity of animals and those can produce well and finish on forage must look for a "bull" that has been tested on forage not as usual on grain. The South Mississippi Forage Bull Test Sale has tested bulls on *forage* (FRANK 2012). Soy is one of the main ingredients for cattle feed and it is required to be improved as a raw material in sustainable supply chain. Another ingredient is proteins that was started to be used after 2010 when VION acquired US business Innovative Proteins. Therefore, re-branded Sonac Maquoketa became a producer of quality blood plasma for animal feed, and since 2011, it was also completely cooperated with the current North American production of VION Ingredients (VION 2011).

In beef supply chain, packaging is final stage of production and it is also directly related to ecological issues; moreover it depends on the type of packaging for various brands. This is mainly *packaging* material, *plastic*, *paper*, and *cardboard*, which provide VION's waste flows. VION tends to realize value added activities for all natural materials of agricultural origin outputs in *production chains*. In addition, VION aims to reduce waste from non-animal residual flows and the application of recycled packaging materials. VION has modern recycling that doesn't allow any waste of animal origin; around 99% of all residues of animal origin can be involved in production system again. Moreover, VION made long term agreement with VIGEFT in order to reduce total energy consumption by 50 % in supply chain (VION 2012).

3.2 Social Aspect

In modern farming, "high-quality, nutrient-rich protein while improving environmental stewardship can only be achieved by using contemporary agricultural *technologies* and *practices*" (CLARK 2010). Food safety, quality and price are very essential factors to attract consumers to products of companies in market. Besides profit maximization, firms also have social responsibilities to use high level technology in order to gain aimed social goals. Due to these goals, several issues as well as animal welfare has to be taken seriously for providing warranted *safety* for foodstuffs. In VION case, further concentration on production leads to increase of costs to ensure *food safety*, *preventing cattle diseases*, as well as societal pressures for natural environment protection measures and animal welfare. On the other hand, margins can be improved or sustained through processing slaughter by-products into value-added products (RADEMAKERS 2012).

Other social concerns about beef supply chain include the total amount of *fat* and *cholesterol* that beef product contains, high competition for food resources; raising grain for beef feed or human food (CHEEKE 1993).

Additionally, *hunger, malnutrition* and *obesity* are considered in strategic planning of VION; fighting against them with competitive partners and prevents the planet (VION 2012)

Logically, it is determined to ensure social sustainability by the *entrepreneurship, transparency* and *integrity* in VION. Especially, transparency should be realized in order to obtain the social goals described above. Good monitoring and controlling systems are required in social company because of being able to gather useful information about the enterprise and assess financial and environmental sustainability as well as acting responsible against employees (VION 2012).

3.3 Economical Aspect

In supply chain, various management programs as *SPA* and *Integrated Resource Management* are doing function of recording and general evaluating an operation. These functions are vital to judge the economic situation as cost/benefit effectiveness of the operation and to see progress towards goals (FANATICO et. al).

Obviously, profit maximization is the main purpose of companies to exist. However, the short-term development of supply chains compel these companies to act social responsible too. Respectively, improve life conditions of *employees* that also lead to deal with social and environmental issues such as *child labor* or ecological pollution. Participation in such *value chains* can offer sustainability as a process to regularly expanding of their capabilities. Therefore, agricultural firms have to pay attention on economical issues because of that it provides the starting point for sustainability and ensure the future existence of company (UNIDO 2004).

Although the stable meat business position of VION in Europe market, company always tackles with cost cutting, and looking for gaining growth by *innovation of processes, technologies* and range of offers to customers. However the future growth of VION also depends on acquisitions and joint ventures in the meat industry and company is planning to realize these issues. Regarding to CFO TON LAMMERS: "VION has a war chest of €150 to €200 million for future acquisitions and more capital will become available with the projected divestment of *Banner*". Another value added activity can be slaughter by-products that is able to provide financial advantages for VION and take off the pressure on fresh meat margins (VION 2012).

4. Evaluation and Conclusion

Consequently, for running a sustainable firm in *beef supply chain*, producers definitely need to have several factors like a farm management which includes business goals; provide the enterprise is economically viable such as actively reaching, evaluation and using advice and up to date information, have flexible management strategies to be convenient to changes in climate and dynamics of markets. Therefore it would be better to ensure that their product characteristics meet market requirements and give warranty regarding to their production system overlaps with consumer preferences in terms of *animal welfare* and *demonstrated care for the environment*. The last one means to provide no visible damage as land degradation and conserve field of domestic biodiversity on their property (WALKER 2003).

There is the *Global Roundtable for Sustainable Beef* (GRSB) that is a global, multi-stakeholder venture founded to improve sustainable production of beef, through the engagement of stakeholders in the whole beef value chain. The main object of this organization laid on establishing a "multi-stakeholder initiative" by achieving greater clarity and deepening alignment around the crucial issues that have influences on the *sustainability of the beef production* system. It also aims to advance continuous improvement in the sustainability of the global beef value chain by some economic, environmental and social legislation. The GRSB envisions a world in which all aspects of the beef value chain are *environmentally responsible, socially equitable* and *economically viable* (GRSB 2012).

The producer's aim should be the profitable production, but also the most humane and efficient ways are needed to be practiced in order to gain *safe, consistent, high quality product*. (WALKER 2003). VION make long term strategic planning to contribution to *sustainable future* of company and the agricultural field in European countries. On this purpose, it plans to make wide range of corporations (like *Ecoston, Rousselot*) in order to realize *sustainable production*. There corporations help to use applied technology that will lead to *safe and long term sustainable production* in the beef industry (VION 2012).

In analyse of sustainability, the certain aspect of this term was defined in beef sector. They have various applications depend on activity areas of companies. If we compare situations between *South America* and VION in the context of *sustainability*, it will seem that second one has more advantage on it. However, it becomes really hard for VION to compete with South American companies in the beef sector because of the *advantage of very low-cost domestic production*, a big unexploited potential for exports, economies of scope in production (RADEMAKERS 2012). Nevertheless, sustainability is core part of VION's strategy because of that it is gained and realized as value added actions in company. In spite of importance of environmental issues on companies' production, all aspects of sustainability were stated in company's mission as "Passion for Better Food is VION's motto. The business seeks to offer healthy, high-quality products whilst maintaining a good balance between people, planet and profit. VION's products and production methods continue to evolve in order to comply with the highest safety and quality standards" (VION 2012).

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