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INTERNATIONAL JOURNAL ON FOOD SYSTEM DYNAMICS

Int. J. Food System Dynamics 8 (4), 2017, 336-346

DOI: http://dx.doi.org/10.18461/ijfsd.v8i4.846

Governance and Growth – a Case Study of Norwegian Whey Protein Concentrate Exports

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Received March 2017, accepted September 2017, available online October 2017

ABSTRACT

In this article, we explore the global value chain (GVC) for whey protein concentrate (WPC 80) and permeate powder (PP) through a case study following the practicalities of the export of WPC 80 and PP from the Norwegian farmer-owned dairy cooperative, Tine SA. We follow processing, packaging, logistics and export administration. The study suggests that the value chain and the partnership between Tine and Arla Foods may be described as a "captive" global value chain were Tine is transactional dependent on the main actor, Arla Food Ingredients. We conclude by discussing some features of power relations in global value chains and the global markets.

Keywords:Global value chain; nutrionism; engineered food; agricultural export; WPC.

1 Introduction

According to Feenstra (1998:31), "the rising integration of world markets (has) brought with it a disintegration of the production process in which manufacturing or service activities done abroad are combined with those performed at home". Global value chains (GVC) in international food trade typically consists of several actors of different size at different sites that coordinate their production, distribution, and market activities in a variety of ways.

Production of, and international trade with, whey protein concentrate (WPC) and permeate powder (PP) is an illustrating example. Protein powders derived from whey are among the winners of several new nutrition trends and food developments. Protein powders are used to enhance muscle growth among athletes and others: they help infants to develop, elderly people to gain weight, and aid in feeding people during hunger catastrophes. At the same time, whey-based products are used as functional ingredients in bakeries and processed foods of many kinds. This is reflected in a growing international trade in WPC and PP. Moreover, WPC and PP are products that are characteristic for the era that Scrinis (2013) labelled functional nutritionism: an era in which nutritional engineering, corporate strategies, trends in food, diets and health, as well as governments' food and nutrition policies, melt together (Scrinis, 2016). As food is being engineered and reengineered, processes of globalisation and international trade in food, are becoming increasingly complex. The combination of disintegration of the production processes on the one hand, and new products and markets on the other, both creates new partnerships, and puts the issues of power and governance in international trade in the centre of market developments.

These developments also reveal that we do not fully understand how these new markets actually work. There are few ideal markets, where transactions are done one at a time and at arm's length. In real life, there are no Walrasian auctioneers in place to clear the market(s). Nor do we find many vertically integrated hierarchies that completely manage production and trade from "farm to fork". The realities of the market in international trade is something in-between, and different. Douglas North once said that he

found it peculiar that economics "contains so little discussion of the central institution that underlies the neo-classical economics – the market" (North, 1977). Now, 40 years later, the question is still relevant, and it is necessary to explore the practicalities of value chain governance to understand the workings of markets for food and food ingredients.

The objective of this paper is to contribute to the understanding of global value chain governance in general, and the market and power relations between actors in the emerging markets for food and food ingredients in particular. We will explore how the GVC theory may benefit from an analysis of the practicalities of governance in the contemporary nutritionist regime, and use explorative case studies to study the characteristics of the emerging partnerships and the governance of international trade in new and engineered food products. Cochoy (1998), addressing knowledge of the market economy, described the managerial and marketing sub-disciplines of economics as a kind of know-how for capitalism, which is interested in the practicalities of business, but where the academics – the experts – from time to time need to go back to the field of practice to "relearn" from the business again. This is what we try to do in this paper. We walk along the value chain – chasing an understanding of the workings of the market and the business.

To be able to shed light on the governance of a GVC in the developing markets of food ingredients, we explore the practicalities of production and trade of whey protein concentrate (WPC) and permeate powder (PP) through a detailed and theory informed case study (Moses and Knutsen, 2007; Yin, 2003). This in accordance with a theoretical perspective that emphasises that the social and material complexities of global markets require an investigation of both actors and devices involved with the production, the logistics, trade, and consumption of commodities (Callon, 1998; Callon, McFall, 2009). We therefore present a case study exploring the export of WPC and PP from the Norwegian farmer-owned dairy cooperative, Tine SA, through a global value chain (GVC) for which Arla Food Ingredients is the core actor, and Tine SA is a small supplier.

The case, Norwegian exports of WPC and PP, is intriguing with regard to power and governance. The main focus of the agricultural sector is on the domestic market. Norway does not have much of a comparative advantage in agriculture. Consequently, it is not surprising that we do not see a lot of exports from Norwegian agriculture (Eldby & Tufte, 2007). Nevertheless, there has been a series of attempts to create exports from Norwegian agriculture, but many have failed (Kjus & Kvam, 2010). Thus, WPC and PP constitute rare, but successful, export commodities from a sector with a very limited record of exports. What does it take for a small exporter to connect to global value chains in an era of functional nutritionism? What characterizes the relationships in terms of dependencies and power? How are partnerships and trade organised and managed, in practice? The Norwegian WPC and PP export is therefore a case well suited for studying the market, the trade, and the practicalities of food trade governance.

The organisation of the article is as follows: In the next section, we present the theoretical framing of our analyses. We proceed the article with a brief description of the method and data applied. Thereafter, in the result section, we present the case – Norwegian exports of WPC and PP. In the description, we deliberate on the products, markets, actors, and the processes the products goes through, as well as the lines of management and logistic planning of WPC 80 and PP production. In the analytical section – based on the theoretical and empirical input of the previous sections, we discuss how to characterise the GVC, the relations between actors, and their strategic options. Finally, we conclude with a summary and a broader discussion of the implications our findings have for our understanding of global value chain governance and the relations between actors in markets for food and food ingredients.

2 The theoretical frame

The concept of Global Value Chains (GVC), in general, and its governance, in particular, has received considerable attention in recent years. The journal "Economy and Society" had a special edition in 2008, addressing the governing of GVCs and various understandings of governance (Bair, 2008; Gibbon, Bair, & Ponte, 2008; Gibbon & Ponte, 2008). In a special edition of "New political economy", the focus was on how to better understand the implications of a GVC world for global economic governance, with an explicit normative approach (Bair, 2017; Mayer & Phillips, 2017; Mayer, Phillips, & Posthuma, 2017; Mosley, 2017; Posthuma & Rossi, 2017). This is a part of a direction to address the problem of "global governance" (see also Gereffi, 2014), or the problem of regulation and global corporate governance (Gachukia, 2016; Mayer & Gereffi, 2010). In addition, the "Journal of cleaner production" addressed the consequences of global value chain governance on production sustainability (Bush, Oosterveer, Bailey, & Mol, 2015).

In our article, we address governance as the cooperation or interaction between firms in the GVC. In a very fruitful framework for understanding and analysing governance in global value chains (GVCs), Gereffi, Humphrey, & Sturgeon (2005) built on insights from industrial organisation and transaction cost economics (e.g. Williamson, 1975; Williamson, 1996). In transaction cost economics (TCE), an approach to industrial organizations that comprises a combination of three variables – opportunism, bounded rationality (or limitations in access to information), and asset specificity – may be used to hypothesise how organisations and management will unfold (e.g. Williamson 1989). In the ideal market, where buyer-seller transactions are done one at a time and at arm's length, no lasting relationship exists. The hazards of transactions are not too problematic, and one could hypothesise that competition has replaced contracts as coordination mechanisms. However, with high asset specificity, which we often see in food markets, idealised market conditions are violated. Asset,- or factor specificity implies that investments are approaching irreversibility and, therefore, asymmetric dependencies and uneven power relations arise between actors. Suppliers of specific assets become dependent on the buyers, who have the power to hold-up the suppliers. Furthermore, lack of information and trust – due to possibilities for opportunistic behaviour (Williamson 1989:139) – increases the transactional risks of actors in the market. In general, second order consequences of this may be a higher presence of control and hierarchical forms of governance rather than flat organisational forms (Vik, 2006). The approach of Gereffi et al. (2005) to global value chain governance built on various variables: complexity of transactions, codifiability and control of information, the capacity of the suppliers, and reflections on asset specificity. This led Gereffi et al. to develop a typology of five types of global value chain governance: markets, modular value chains, relational value chains, captive value chains, and, finally, hierarchies, where we may speak of one integrated firm and a clear chain of command. In this article, the three "network" categories of chains – the ones that lie between the "pure" market model on the one side, and the integrated hierarchy on the other, will be of interest. Gereffi et al. labelled these as modular, relational, and captive value chains.

In the modular chain, suppliers make products for a buyer based on the specification of the led firms. Yet, the supplier takes full responsibility for competencies surrounding the process technology and the use of generic machinery. The cost of switching to new partners remains relatively low. In the relational value chains, transactions are complex, knowledge tends to be tacit, and the production specifications are hard to codify. Therefore, buyers and suppliers are mutually dependent on each other. In the captive value chains, however, "small suppliers are transactionally dependent on much larger buyers. Suppliers face significant switching costs and are, therefore, 'captive'. Such networks are frequently characterized by a high degree of monitoring and control by lead firms" (Gereffi et al., 2005: 84). However, the relationships between forms of governance are dynamic. As an example, Pananond (2016) presented the argument that firms may improve their power position through increasing their control of the chain as they upgrade production or expertise.

The description of captive value chains fits well with several other characteristics of business conglomerates in contemporary food value chains. The situation is due to the buyer power, and some basic oligopsonistic characteristics of agricultural markets, both in the primary sector (Rogers & Sexton, 1994), and in the industry and end markets (Constance & Heffernan, 1991; Dixon, 1999; Olsen, 2015).

New developments in international food markets may also influence the workings of GVC in the food sector. The possibilities to deconstruct whey into its micro-nutrients has been mentioned as a part of a larger trend – or an era – of nutritional engineering labelled functional nutritionism (Scrinis, 2013). The food sector under the era of functional nutritionism is characterised by an increased role of corporate interest in the production and trade of foods where they "frame the design of dietary guidelines, the information on food labels, food companies' engineering and marketing practices, the public's understanding of food and dietary health, and governments' food and nutrition policies" (Scrinis, 2016:21). A key strategy for food companies in this paradigm is technological re-engineering of the products accompanied by the creation of new markets and marketing strategies.

In the international WPC and PP markets, the trend of functional nutritionism appears to converge with the developments in global value chain governance. Large corporations co-produce (end-)markets, suppliers, products, and logistics chains. The vertical and horizontal integration accelerate during, or through, market creation.

In this article though, we aim at exploring how the GVC theory may benefit from an understanding of the characteristics of the contemporary nutritionist regime and a study of the details of the organisation of market transactions. Thus, we present a modest contribution to the expansion of GVC theories and follow the example proposed by Ponte and Sturgeon (2014) by connecting theories of GVC governance with additional theories – in our case, on functional nutritionism (Scrinis, 2013; Scrinis, 2016) and market devices (Callon, 1998; Callon, Millo, & Muniesa, 2007).

3 Method and data

In terms of a method, this article is a case study (Yin, 2003) that partly is informed by theory and partly aim at contributing to the development of theory (Moses and Knutsen, 2007). Our case is the value chain for WCP 80 and PP produced in Norway by Tine SA, the main Norwegian dairy company, and sold into international markets by Arla Ingredients.

In this case study, we interviewed people closely connected to the production and export of whey products, eight individuals in total. All interviews were semi-structured (Galletta, 2013). In the Tine system, we met with six people from four distinct locations throughout the organisation. First, we interviewed the commercial director of the "Tine Ingredients" division, who is responsible for Tines industry customers and the export of whey powder. Second, we interviewed the export manager and one export coordinator from Tine's export division, who manages the practicalities and formal requirements related to the export of whey products. Third, we met a person from Tine's prognoses department (Tine OPV), located at the production facility in Trondheim. This employee is responsible for developing prognoses for whey and whey powder production, and for production chain management. Fourth, we interviewed the manager at Tine Verdal, a production facility that is one of two production sites for whey powder processing in Norway. At Tine Verdal, we also interviewed a process leader at the production facility that provided a tour for us to see how the production process in the factory occurs. We also visited the Arla Foods Ingredients (AFI) head office in Vieby, Denmark. There, we conducted two interviews, first with the category director for WPC80, and then with a manager responsible for sales of PP. All interviews were conducted face-to-face, tape recorded, and transcribed. Main interviews with the directors at Arla and the director at Tine lasted for about two hours. The other interviews lasted from 1 to 1.5 hours. Interviews with Arla's category director and with Tine Ingredients' commercial director involved questions on strategy, plans, negotiations, visions and aims, etc., while the other interviews were mainly focused on the practicalities and actions of the operations involved in production, logistics, and trade.

In addition to the interviews, we collected data from brochures, annual reports, homepages, etc. Altogether, the data we gathered gave us a good understanding of the products, the production and trade processes, the actors involved and the relationship between them, as well as coordination devices involved. This make us able to describe and analyse the governance of the global value chain for WPC and PP.

Below, we present the results. The information we gathered came from several sources. Together it build a compound picture. Here, it is the description of the processes, and the workings of the GVC that is important, not the individuals. Therefore, unless we are quoting individuals, we have not assigned the various pieces of information to specified interviews.

4 Results

Products and market

Milk is used to make cheese, and whey is a by-product of this production. Traditionally, in Norway, whey has been used for production of brown cheese, prim, milk powder, and as animal feed. To convert whey into WPC 80 and PP, the whey needs to go through what is called an ultra-filtration process. The first step in the production is the ultrafiltration process used to separate protein from the rest of the whey. This is accomplished by "squeezing" the whey through large filters that are able to separate the whey on a molecular level. When this process is complete, the liquid protein is sprayed into huge tanks, up to 7.5 floors high, to dry the powder by using an energy-demanding, spray-drying technology. When the protein has dried, the powder contains a minimum of 80 percent protein and becomes WPC 80.

When filtrating protein from the whey, the by-product is permeated. The main challenge in processing permeate is the drying and cooling processes. A key issue is that a suboptimal process results in wrong-sized sugar crystals or lactose. This alters the functional qualities of the powder and is, therefore, critical. When the process fails to fulfil quality requirements, the result is a quality sold to feed customers at a lower price. In cooperation with Arla, Tine has invested in technology that reduces salt minerals and the strong taste of salt, which means that PP from Tine has a rather neutral taste that many customers prefer.

Due to its nutritional characteristics, important markets for WPC 80 are various functional food ingredients, sports shakes, sport-related food additives, baby food, food additives for elderly people, and food-aid products. Increasingly, WPC 80 finds new markets due to its functional characteristics and its applicability as a food ingredient. For instance, it is used to alter the consistency of and add protein to yoghurt, and it is used as an input for baking, processed meat products, ice cream, etc., due to its applicability to influence smoothness and other non-nutritional characteristics of food.

WPC 80 is sent to Denmark, Russia, Japan, and the US. According to AFI, WPC 80 is mainly sold to the American market for sport-related protein drinks. There is a high tariff for sales from Norway to EU. Therefore, the EU is not an important market for Norwegian WPC. Furthermore, the US market is the largest WPC market in the world.

AFI sells permeate powder (PP) primarily to the food industry. There is a demand in the food industry for permeate powder because it is cheaper than the alternative milk powder, but also because it has other functional uses. PP is a commodity product, and an established index in the US reports prices on a weekly basis. This list is a point of departure for price negotiations between AFI and its customers. Yet, the price of lactose varies with quality. AFI divides permeate into four qualities: feed, food, infant, and dry blend. Feed has the lowest quality requirements while the "best" quality is dry blend. Arla's ambition is to produce as much dry blend as possible. Thus, the company has established two factories to produce this substance. Production of dry blend separates permeate into lactose and minerals, in which the minerals represents a by-product. PP produced by Tines is of food quality, and is mainly sold to countries in Asia.

The actors

The Tine group is one of Norway's largest food companies. It is a full-scale supplier of dairy products with well-known brands in the Norwegian market. Tine is owned by about 12,000 dairy farmers and is organized as a cooperative. The group has more than 1,300 product lines and produce at 30 dairies located all over the country. Total revenue in 2014 was 21,473 MNOK and the number of employees was 5,463 (Tine Annual Report, 2014).

Much of Tine's international activity for its ordinary dairy products is in the US, Sweden, Denmark, and the UK (e.g. Jarlsberg cheese). The Tine Ingredients division is responsible for sales to industrial customers in Norway and the export of whey products.

From 2010 to 2013, the dairies at Verdal and Jæren underwent major investments to produce WPC 80 and PP. The production site at Tine Jæren is new, while the Tine Verdal site has been rebuilt. At Tine Verdal, the price of this investment has been around 450 million NOK. Today, 20 employees work at the whey-processing factory that also produces a range of ordinary dairy products.

Tine cooperates with Arla Foods regarding exports of WPC 80 and PP. Arla Foods is a large dairy cooperative, owned by farmers located in many European countries. According to Arla Foods's homepage, the organization is owned by 12,500 farmers in seven European countries. Arla is a global dairy corporation with production in 13 countries, and the primary office is in Vieby, Denmark. The Arla Food Ingredients (AFI) division is responsible for whey-based products in Arla and has 650 employees, about 127 of whom are located at the primary office. AFI sells products internationally, and has factories and sale offices worldwide. AFI became an independent division within the Arla Foods Group in 2011. AFI also has its own factories to process company-branded products, and a specialised R&D division for product development.

The filtration technology made it possible to develop new products during a period when there was no previous market demand. Thus, whey-based products are developing in close cooperation between the customers and the R&D department. AFI has three business units: Nutrition, Functional Milk Protein, and Permeate & Lactose. Protein is a high-value product, while permeate is viewed as a low-value ingredient. In recent years, Arla has invested in factories and technology that make it possible to produce lactose from permeate that result in higher value products for, as an example, the pharmacy industry.

Arla has invested three billion DKR over the last three years in protein production installations, which represent the greatest investment Arla has ever made into the company. Revenue in 2014 was nearly three billion DKK for Arla Ingredients. Regarding WPC 80, Arla has about 15% of the world market, and about 50% of production is sold outside the EU. Company objectives through 2017 is to reach a revenue of five billion DKK with nine billion kilograms of whey, and to offer the highest quality whey in the market. Quality means a higher price than that of commodity products. This strategy demands an advanced R&D division, which today employs around 60 persons, representing 10% of the employees at Arla Food Ingredients. The R&D division has a close research cooperation with Danish and other universities as well as with customers.

To reach the goal of becoming a market leader, Arla needs an increased supply of whey. Therefore, the Arla Group has established international partnerships and joint ventures. This makes Arla the main actor in the global value chain for Norwegian whey products. Tine and Arla established a partnership in 2008. Prior to that, Tine used traders to sell whey powder in export markets. Tine and Arla are competitors in the Norwegian market for other milk products, particularly yoghurt and cheese. According to the commercial director at Tine Ingredients, Tine decided to cooperate with Arla for several reasons: Arla was believed to possess much of the same business culture as Tine, Arla is a cooperative, the location is

nearby, and it is possible to communicate in Norwegian. The agreement between Tine and Arla stated that AFI is obliged to receive the entire production of WPC 80 and PP from Tine. Tine, on the other hand, is allowed to sell its own WPC 80 and PP to customers in Norway. The agreement from 2008 lasted until 2011 when it was renewed, with 12 months of mutual termination rights. The latest renewal of the agreement was established in 2016, with 12 months of mutual termination, after a rather lengthy review and negotiation process.

5 The processes

The biological basis for production is the share of the total cheese market in Norway that Tine is able to capture. To make white cheese, one needs to separate the milk by adding rennet or an acid. When the milk separates due to a coagulation of casein, the next step is to "collect" (some of) the solid parts that become cheese, while most of the liquid is a protein-rich leftover called whey. About 640 million litres of whey are produced at Tine every year, 20 million litres is allocated towards whey powder, 80 million litres to brown cheese and prim, and 540 million litres to WPC 80 and permeate powder.[*]

Tine has produced whey-based powder products at their production facilities at Verdal and Jæren since 2012. Both production facilities receive whey from other dairies that produce white cheese. The two production sites each produce about 1,700 tons of WPC80 and 11,000 tons of PP yearly. About 600 tons of WPC80 and about 1000 tons of PP go to the national market. About 2,800 tons of WPC 80 and 21,000 tons of PP are exported via AFI each year.

Both for WPC80 and PP, when processing is finished, machines automatically package the product in labelled 25- or 1000-kilogram sacks before they go to stores. Tine purchases the sacks, but both the design and the decisions concerning the type of packing and labelling lie at AFI.

Tine has a system for weighing and labelling for each batch produced. Each batch has its own series number, and each sack and pallet has its own procedure regarding the series number and quality and production information. During the production period, Tine Verdal does not know where to send the product. Therefore, they need a new procedure for each batch when they receive an export order forwarded by Tine's export division. They use various procedures for distinct export countries. The procedures inform the organization about the country of destination and a shipping address.

There are many specifications and demands to follow in the production process to reach AFI's quality standards. Tine must analyse each batch and a certificate of analysis (COA) must follow the product to the export market. Tine conducts bacteriological and chemical tests to ensure the quality of the product during the production process. Tine runs certain tests in its own facilities and delegates others to Eurofins, but plans to conduct all the tests in the future itself. Another important quality issue is the traceability of all products, and that the products meet kosher and halal requirements. For Arla, kosher and halal requirements are important because the company wants to avoid setting up different production and distribution chains for different markets. For Tine Verdal, this means that they must change the type of rennet they use to start the initial milk separation process.

Quality is not only monitored at a distance. Some of the more substantial customers of AFI want to personally inspect the processing plant to ensure that the production is of a high quality. In such cases, the customers visit Tine together with representatives from Arla.

An important division for coordination of the value chain is the prognoses division at Tine (Tine OPV). This division's main operation is to produce prognoses for production of Tine products as a basis for coordinating acquisition of input factors, production volumes, and sales. Tine OPV produces 12 months of rolling production plans based on expected milk supply at each dairy site specified at weekly production. This plan, which Tine transfers to AFI via SharePoint, shows expected production per week. AFI returns the sale prognoses at product level based on sales and expected sales in the future. These prognoses show an article number for each country in order for Tine OPV to know to which country the products must be transported. Tine incorporates the sale prognoses into their production-planning tool, MPX, which is specified for each production site. OPV decides the distribution of production between the two sites, depending on quality specifications and capacity. Then, each site is informed about how much they must

[*] White cheese production has been steadily decreasing over the years due to the increased import of milk products – especially from the EU. Furthermore, the production of Norwegian Jarlsberg cheese and, thereby, whey, WPC80, and PP, is likely to be reduced as a consequence of an agreement with the WTO (and subsequently, the Norwegian parliament) in December 2015 to stop direct subsidies to agricultural exports by 2020. Norwegian Jarlsberg cheese comprises around 8 percent of Norwegian milk production.

produce to satisfy demand from AFI. Tine OPV and Arla arrange skype/phone meetings every 14 days to coordinate plans and orders. In addition, Tine provides the production sites with four-week rolling plans specified by weekly volumes to produce. Then, the sites themselves develop their own plans at day level.

While Tine OPV organises and coordinates the production, the Tine export division handles the orders from AFI and exports documents. Tine OPV and the export division normally have no contact with each other. Tine Ingredients contracts the export division to handle the operational part of the export process. This work represents 1.5-man/year for Tine exports. On an annual basis, the export division deals with about 10-11,000 tons of cheese each year, and about 20-25,000 tons of whey powder on behalf of Tine Ingredients. Compared to typical exports, powder exports have increased substantially in recent years. The export division handles orders from AFI, billing, and customer clearance. In a data program, ERP, Tine registers all information about ordering and billing. The Tine export division receives orders from AFI by e-mail that are specified on type of product, amount, wanted batches, and export country. The order and its specifications are fed into the ERP system. Tine's export division fills in labels agreed upon with AFI that inform customers about product names, batches, quality, and durability. The language on the labels varies also according to AFI specification. Tine export division registers information in an online system with the Norwegian customs authorities. There, data about volume, type of product, value, and customs tariffs are entered into the system. If the information is accepted, a receipt from the Norwegian Customs that shows that the order is accepted and ready for export is attained. Proof that the product has been declared by customs needs to follow the products. This declaration is electronically transferred from the Tine export division to the production site. One copy follows the transporter, and another goes to AFI. The batch lists are sent to AFI to confirm that the right products and batches have been exported. When Tine Verdal/Tine Jæren has loaded the goods on a trailer, the department sends the export division information about the number of the order, date, and the number of the container.

The documents from Tine's export division and production sites are necessary to import the product into a new country. AFI defines the routines connected to transportation and documentation, and Tine follows their specifications. The Tine export division has yearly meetings with AFI, during which established routines are discussed and adapted, if necessary. Such meetings are also important to become better acquainted with each other. The export manager at Tine described that the years of working together has streamlined the cooperation, and that they now knew each others responsibilities.

Price, profitability & future development

The exact economy of whey production and trade is complex and not easily accessible. For the Norwegian part of the value chain, the overall economic picture is also blurred by the fact that the primary production in the Norwegian dairy sector is subsidized. Nevertheless, the message from Tine states that, compared to alternative uses of whey, the new products developed in cooperation with AFI result in higher-quality products and increased profitability for Tine. According to the commercial director at Tine Ingredients, they make "good money" on the whey-based products. Pricing is very different between the two products. WPC 80 has a considerably higher price than PP. However, Arla is working to develop new products towards the quality segment of the PP market, as well. Today, Tine's processing facilities cannot produce the highest quality of either WPC or PP. The extra investments that this would require is not considered profitable due to low production volumes.

The production facilities work based on cost budgets. As an example, Tine Verdal develops cost budgets for each product and has no information about the income structure. According to the local manager at Tine Verdal, the company is pleased if they accomplish the production plans and manage to stay on budget. The economic measures of whey production at large are only available at Tine's corporate level.

It is quite clear from the interviews that Tine thinks the pricing model for WPC 80 is suboptimal. Prices on WPC 80 are not listed in the world market as, for example, dry milk or the base quality of PP. Therefore, Tine and Arla have negotiated a price model based on a US listed price on WPC 35, which is a lower quality product than WPC 80. Tine is not satisfied with this model, as the company thinks the price is too low relative to the high-value profile of WPC 80. However, after a lengthy negotiation process, Tine and Arla prolonged the partnership (implying that the pricing was accepted).

For Arla, the economy of the whey business is considerable. According to the director, the division earned 2.7 billion DKK in revenue in 2014. For Arla, it is important, however, to obtain WPC 80 and PP from its partners around the world in order to fulfil its objectives.

6 The case summarised

Thus far, we have described actors, products, processes, and a partnership in a global food value chain specialised in producing whey-based products for a growing market for functional food and nutrition (Scrinis, 2013). The way that the value chain and partnership between Tine and AFI is organized fits well with the Gereffi et al. (2005) description of a "captive" global value chain. Tine is one of several relative small suppliers to the chain, and is currently transactional dependent on AFI. As we can see from the case description, the complexity of transactions is high, and Tine must adapt to detailed codified instructions from AFI. Tine has been lacking competence in processing concerning using new machinery and equipment; therefore, the company has been dependent on support from AFI to produce the demanded quality. Tine does not have sufficient competencies in these productions. For AFI, it is Tine's whey resource that is of interest, which is needed as part of the company's ambitious growth strategy. AFI has not wanted to share information about who their end customers are with Tine, or about the prices end users pay.

In principal, Tine can choose between leaving or staying in the partnership, or exit and loyalty, as Hirschman described in his book "Exit, voice and loyalty. Responses to decline in firms, organizations, and states" (1970). So far, they have chosen to stay. However, all partnerships have pro and cons. The fact that Tine has chosen (voice and) loyalty, thus far, and has renewed the partnership with Arla implies that the advantages were seen as more significant than the disadvantages. However, the lengthy process of renewing the agreement suggests both that Tine was not satisfied with all parts of the cooperation, and that Tine used considerable energy to discuss improvements (voice). According to the commercial director at Tine Ingredients, the so-called "price model" for WPC 80 was one of the problematic themes. Another point of dissatisfaction was lack of information about customers for Tine's export division, and the informational asymmetry this created. On the positive side, from Tine's point of view, it is clear that AFI has invested substantially in the relationship with Tine. Since the agreement has been established, they have supported, and continue to support (with knowledge and expertise), the development of the new production facilities in Norway. They have also invested heavily in infrastructure, logistics systems, and quality systems to manage the entire procedure to allow the whey products to process as effortlessly as possible from Tine's production facilities to AFI's customers around the globe. The investments in devices and infrastructure also implies a continuous upgrading of Tine as a supplier. For AFI, this may imply a danger that Tine, through upgrading of processing and/or market knowledge, may try to improve its power position (Pananond, 2016). AFI's strategy, by not giving information about customers and prices to Tine, suggests that knowledge and information is used as critical assets to avoid losing the control over Tine as a supplier, and that AFI may be trying to keep Tine "captured". This is clearly in line with Gereffi et al. (2005) and their description of a captive global value chain.

Nevertheless, Tine could withdraw from the partnership and find another main buyer, or start to export whey through the service of traders and intermediaries. Clearly, this option has been on the table during the negotiations. However, the risks associated with these strategies may be significant. As Tine has invested substantially in the production facilities in Verdal and Jæren, the company is bound to continued WPC 80 and PP production. This is, therefore, a classical example of the "hold-up" risks associated with asset specificity (e.g. Williamson, 1985). Furthermore, it seems like the characteristic of a regime of functional nutritionism causes the bind to be tighter, and the costs of switching to be even higher. In addition, the asset specificity is high due to the investments in the processing plants. Maybe equally important are the investments that the core of the global value chain – Arla Foods Ingredients – have made in the co-production of the nutrient products and the market for nutritional food ingredients. The goals of AFI to be the market leader in the high-value functional nutrition market is in accordance with Tine's strategy to increase the value of whey products. Without the cooperation with AFI, the danger for Tine is to be cut off from the value-added activities of AFI's nutritionist engineering and remain a raw material commodity supplier without benefiting from the development of value-added products. This adds a considerable expense to Tine's potential switching costs. A hypothesis is, therefore, that practices of functional nutritionism adds to the captive characteristics of the already oligopsonistic nature of the global value chains of the international food market.

Unsurprisingly, the strategic implication is that for Tine – and the Norwegian farmers – it is probably profitable to continue to be a part of the established and developing GVC. For a minor global actor, an obvious precondition for being an exporter to the global markets is the use of intermediaries with familiarity and access to important markets. Tine probably does not have the volume, market knowledge, or resources to access the international markets without assistance. It also seems that, in the age of nutritionism, a key to success for large companies is to develop food into something more through "re-engineering". Furthermore, to serve the markets in a functional nutritionist era, it seems necessary to

build alliances with actors in several countries. Although the interests may differ, and the relations may be asymmetric, the need to coordinate is obvious and may level out conflicts of interests and pave the way for well-functioning global value chain governance.

7 Conclusion

In this article, we have presented a case study of the export of WPC 80 and PP from the largest Norwegian farm owned dairy company, Tine SA. They are a part of a global value chain where Arla Food Ingredients is the key actor. We have explored the practicalities of production and trade of WPC 80 and PP in order to shed light on the governance of the GVC. The objective has been to contribute to the understanding of global value chain governance in general, and the market and power relations between actors in emerging markets for food and food ingredients in particular.

The case confirm that the generic GVC typology of Gereffi et al. (2005) are well suited to describe the landscape of asymmetric dependencies that may exists between actors in a global value chain. Our case fits well with Gereffi et al's description of a captive value chain, where "small suppliers are transactionally dependent on much larger buyers. Suppliers face significant switching costs and are, therefore, 'captive'. Such networks are frequently characterized by a high degree of monitoring and control by lead firms" (Gereffi et al., 2005: 84). In our case, we also see that, potentially, it is possible for a subordinated part in a partnership to develop strategies that increase their independency and thereby transform the value chain from one type to another. However, the nutritionist characters of the WPC and PP markets seem to add to the tight bond between the partners.

The investments necessary for the suppliers in order to meet the demands for high quality products increase their dependency. The large investments that the core actor does in research, coordinated co-production of products and markets, processes and monitoring, further increase the dependency of the supplier. The core actor's control of the research and customer relations makes switching partners both risky and costly for the supplier. The web of coordinating routines and devices is key to the strong bonds between the actors. The conceptual, material, and coordinating devices that are developed and utilised to make the trade and logistics flow smoothly between actors, is simultaneously binding the actors in the market and the value chain closer together. A trade at an arm's length changes to a close and lasting hug.

The combination of research-intensive co-production of markets and products on the one hand, and strong – yet asymmetric – bonds between actors, seem to do something with the way the market functions. As the products move from bulk commodities to high-end, value-added qualities, the pricing become less transparent, while the dependencies and lack of information of the suppliers in the oligopsonic market structure move the market away from the ideal model and create an unfavourable distribution of the added value – for the supplier.

Acknowledgments

This article is a result of the project "Traders in the food value chain: Firm size and international food distribution" 2014-2017, financed by the Norwegian research council (RCN Project Number: 233836). We want to thank Karl Rich, Arne Melchior, participants at the 11th Igls forum on "System dynamics and innovation in food networks 2017", and the anonymous reviewers of this journal for valuable comments and advice on earlier drafts of the article.

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