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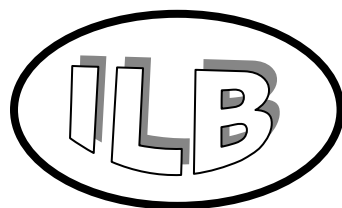
System Dynamics and Innovation in Food Networks 2009

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Risk and Contract Relationships

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1. Introduction

The current structure of the German agri-food-sector is deduced from an increasing (international) competition and its division into small and medium business units particularly on the producers' side. The roots of this development lie in a more a hundred year's history of a productive branch that was intensively shaped by co-operatives. Nowadays this cooperative structure competes with networks and capital market-oriented firms that raise the question of the today's role of cooperatives (see Kühl/ Hanf, 2004)

In the following sections different approaches evaluating possible strategic paths of the actors within the production chain in the agri-food-sector will be presented. As a consequence risk issues agricultural economists have to address will be differentiated. Just (2003, p. 135) claims that "for the most part, longer-term risk issues have been examined only in the agricultural finance literature". We support his statement when we estimate general valuation models – especially to judge the sustainability of cooperatives – as too much referring to the past and try to integrate more future oriented methods as in the case of due diligence.

Contract production and contract marketing are becoming increasingly important for organizing the agriculture supply chain. Consumers are becoming more discriminating. Producers trying to meet these discriminating consumer demands are developing new products and services and seeking more production efficiencies by more closely coordinating their buyer and supplier relationships within supply chains.

The effectiveness and long-term viability of a supply chain is determined in no small part by how well the coordination governance structure manages the sharing of the risks and rewards of the supply chain among participants. The different types of risks encountered in alternative supply chain business structures, the incidence of risk on the part of the individual supply chain participants has important implications for who will be the most likely participants in a supply chain, as well as the benefits the various players will receive. Fundamentally, every transaction has three basic elements: the allocation of value (or the distribution of gains from trade), the allocation of risk (when value is subject to uncertainty), and the allocation of decision rights.

A contract is simply an institutional construct that outlines the mutually agreed rules (and expectations) of how these fundamental elements will be addressed in the transaction relationship. Even the simplest spot transaction implicitly features each of these dimensions to some degree. However, as the element of relational contracts is introduced into the transaction, uncertainty becomes increasingly important and the interplay between risk, value, and decision rights becomes clearer. As a result, how the terms of the contract treat those factors, especially the risk factor becomes increasingly important as well.

2. Differentiation of Risk

There is no business relationship that is free from risk. For further differentiation of risk various sources of risk potential will be assumed. On the one hand risk is “business inherent” and is related to the entrepreneur’s individual decisions. On the other hand it is “exogenous” from the enterprise’s point of view as e.g. general market risk (like the prices for purchase or selling of commodities) or climate. Managerial decisions concerning resources and capabilities are characterized by various factors. Within the agri-food value chain we will consider the following distinction (see Amid/ Schoemaker 1993, p. 33, adapted compilation):

1. Uncertainty about
 - a. natural, climatic, geographical environment;
 - b. economic, industrial, regulatory, social and technological environment;
 - c. competitors’ behavior;
 - d. customers’ preferences;
2. Complexity concerning
 - a. interrelated factors that shape the firm’s environment;
 - b. competitive interaction arising from differencing perceptions about these environments;
3. Inter-organizational conflicts among those who decide and those who will be affected.

Any decision will be affected by these factors according to the decision situation. First of all a general distinction based on the portfolio-theory (Markowitz, 1952) will be made. Risk may be separated in a systematic and a non-systematic part. A systematic risk displays exogenous influences such as (natural) catastrophes, changes in the political environment or changes of market interest (Sharpe, 1964; Lintner, 1965; Mossin, 1966). Based on this the Capital Asset Pricing Model (CAPM) calculates market risk rates that investors at least estimate from their investment. Non-systematic risk includes management errors such as decisions concerning wrong product policy. Concerning the valuation theory – on certain restrictive conditions – this risk may be completely hedged via portfolio selection on the side of investors as risk takers.

2.1 Business risk

Business risk in our case is due to include the total set of non-systematic risks. Business inherent risks from our point of view are derived from entrepreneurial decisions in the agri-food sector and the interconnections the entrepreneurs agree to. In a common distinction Kahneman et. al. differentiate between uncertainty and ambiguity. Deciders will face them with a certain idiosyncratic aversion (Kahneman/ Tversky, 1979). Furthermore, decisions may be influenced by information asymmetries, lacks of commitment and trust (Furubotn/ Richter, 1997).

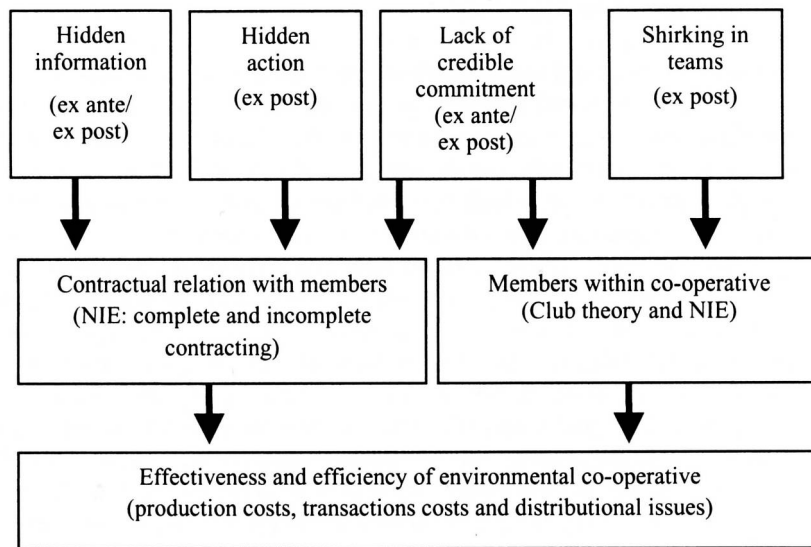


Figure 1. Efficiency and design principles for institutional arrangements in which farmers co-operate (Polman/ Slagen, 2002, p. 97)

In general the conflict between principals and their agents results from the fact that they have different goals and the principal cannot determine if the agent has behaved appropriately (Eisenhardt, 1981, p. 61. For a solution of the above mentioned principal-agency-problems see Polman/ Slagen, 2002, pp. 98).

There is also the fact that agricultural goods are mainly regarded as commodities leading to an easy achievable substitution of suppliers and a competitive situation with cost pressure. The context of recent food scandals may illuminate these pressures. The problem of business activities monitored by third parties outside the participants of the value chain is an inherent and latent incentive for the defection of contractors. There is no doubt about the necessity of the surveillance of quality of agri-food products, especially on the conditions of an intensifying competition and internationalization. As a result an incentive conflict can be depicted in a surveillance or inspection game (see Burger, 1994):

		Controller	
		Control	No control
Potential polluter	Pollution	-1 / 2	2 / -2
	No pollution	0 / -1	0 / 0

Figure 2. Surveillance / inspection game

As an example an enterprise as a potential polluter is advised by law to dispose its waste properly whereas the control authority is obliged to inspect and supervise according to the law. In the case of control / no pollution the costs of surveillance (controlling expenses) are 1. Consequently these costs could be saved because there wouldn't be any difference recognized in the environment between "no pollution / control" (0/-1) and "no pollution / no control" (0/0). Furthermore if a case of pollution becomes obvious and has to be disposed by the authority resulting from its lack of control, the costs will be measured -2, the benefit for the polluter will be +2. In this situation the control authority has the incentive to avoid further failure and will

control potential polluters again and perhaps catch them in the act. Thereafter the benefit for the control authority will be +2 for its success and -1 for the polluter. As a result a spiral process of acceptance and defection of laws is accruing between controller and polluter because this situation can't be regarded as stable. It becomes obvious that the game will result in a Nash-equilibrium situation: The control authority should inspect a potential polluter with a probability of 2/3 and the polluter "should" violate the non-pollution-doctrine with a probability of 1/5.¹ Transferred to a situation within the agri-food-chain there remains an incentive to violate e.g. the quality standards in the dairy sector what is tightly controlled. As a possible consequence the members of the agri-food value chain have to face the situation that parts of the chain – e.g. industrial consumers of their products – may have hidden incentives as a result of third-party control by law.²

2.2 Risk awareness

The importance of firm-specific factors as an explanation for the variety of rents has been recognized for long (e.g. Selznick, 1957; Ansoff, 1965). This is to be assumed for the agri-food industry in particular. As a consequence various approaches exist to cope with risks like transaction feasibilities on future markets for agricultural commodities (Drummond/ Goodwin, 2004, pp. 340). Besides the above already mentioned speculation effects the usage may be hindered additionally by individual mindsets as Kahneman et. al. have shown (see Kahneman/ Tversky, 1979; Kahneman, 1982; Kahneman/ Tversky, 2000). Just et. al. (Just et. al. 1999, p. 847) point out that American farmers are apparently unwilling "to give up \$ 0.65 (\$ 1.34) per acre for a 1610 (819) reduction in per acre net revenue variance." Furthermore Just et. al. highlight the farmer's reluctance to use future markets generally.

2.3 Market risk and market orientation

Systematic risk includes external factors which have a general impact separate from the risk potential that is generated by the regular entrepreneurial business duty. In the terms of valuation theory, investors are unable to hedge these risk types by investing in different opportunities as financiers. Ideally investor's risk should be hedged by choosing a differentiated portfolio of investment opportunities. This means that it is impossible to diminish risk towards zero merely by choosing alternative enterprises to invest in. As already mentioned the valuation theory may regard climate as systematic risk. It has to be highlighted that the firm in which the investor is interested in may indeed internally hedge climate risk but from the decider's (investor's) point of view (invest / not invest) this internal hedge falls in the responsibility of the firm's management, is dependent on the competencies of the acting managers and therefore must be classified as unsystematic risk.

Here accrues a dilemma insofar as the valuation science used by banks leads them to the distinction systematic / unsystematic risk and at the same time they get aware that their debtors within the agri-food-chain have to cope with external risks combined with their reluctant use of possible tools to reduce this risk (see above). It has to be underlined that a market orientation

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1. Berkemer (2007, pp. 76) has simulated the spiral process in a 5 Mio. iterations and concluded these probabilities. "Should" violate pollution laws is to be seen in the context of the utility maximization in this surveillance game and is not meant in a moral sense.
 2. Examples of the recent past are the mozzarella contamination in Italy or spoiled meat that was sold as fresh in Germany. This illustrates a hidden incentive of suppliers and the consequences for the commerce as well.

takes effect on farmer's sales side (they should orientate on prices) as well as a valuation of their solvency but the same risk is differently classified. This is one reason why – as we see below – valuation approaches of relationship may have a significant argumentative function.

Generally climate itself is a very particular risk factor within the agri-food value chain. The adaptation of crops to local situations as well as crop rotation is in other words to be circumscribed as hedging risk. Especially Just (1999, p. 129) claims that many of the risk diminishing instruments farmers use are “washed out by temporal aggregation to the annual level” when risk analytical methods are used. His aim is on the one hand to differentiate farm risk down to the decision level and to integrate temporal longer (financial) development in the risk calculation. This points out again the difficulties hidden in the Markowitz distinction of risk for portfolio organization (see above).

On the side of market oriented investors it is interesting to observe the valuation of equity capital of the corporations whose stocks are dealt at the various stock exchanges. As a matter of fact the β -factors of the five largest enterprises listed at the NYSE range below 0.7 what means that they react with a 0.7 fold intensity on the fluctuation of the index (S&P500) they are listed in (own calculation). As a consequence “the market” values equity of these enterprises is not so intensely tied to the value fluctuation of the rest of the market. In 2000 the average β for breweries was about 0.1. There should be a new situation after the concentration process in this sector. To sum up it can be assumed that the intensity of influence of the capital market in the valuation of equity is stronger than the contribution of the agri-food enterprises and their influence on the value of the index they are listed in. This question could be the fundament for further research.

3. Valuation of relationships

Any business relationship implies risks. It is lesser the question of risk per se than the value or the valuation of the risked (economic) loss that should occupy agro-economical considerations. Valuation itself as an individual process has inherent incentives as well. Besides the value of a transaction object of negotiating parties – e.g. during a corporation takeover or the fusion of co-operatives as well as during the purchase of commodities – the contractors will consider the possible actions to have a certain value. Value does not only refer to transacted items. The price i.e. the value of “cooperation” should be covered by synergy effects within the later business process. We will later on stick to this example.

In so far the value of business relationships lies in the value of items or assets brought into the relationship, and the established opportunities or further options that result from the relationship and how the contractors evaluate them. The causes of the evaluation of networks are scarcely differentiated systematically in economic literature (Möller, 2004, p. 123, see e.g. Sydow/Windeler, 1998, p. 274) but they and the evaluators themselves determine the goals, the proceeding and the methods of evaluation. Buyer and seller will in each case estimate the concern lower and higher.

In other cases an economic reasoning may let certain economic conducts look rational – economic facts respectively the cost situation may facilitate big enterprises, independence, sovereignty, or autonomy might be of higher value in the sense of the evaluator than equity return. In all such cases evaluation has an argumentative function: the value of an option may be the crucial fact within a decision process that changes the “track of action”. This value becomes im-

portant not only for deciders towards financiers, investors or members but as well for promoters or consultants. It may deliver the necessary determining argument to convince contradictory groups of interests. In the decision making process a Nash-equilibrium can be found for a mutual agreement (see Bamberg/ Coenenberg, 2000, pp. 227); for the role of Nash-equilibria in Discounted Cash Flow-approaches and the context of due diligence see Hafner, 1993, p. 79, p. 83).

3.1 Different occasions of valuation

As we have already pointed out the evaluation of options must be a decision process derived of an individual “canon of values”. The value of the negotiation item is insofar inseparable linked with the decider’s evaluation of the course of the item’s further action.

Evaluation of assets and their options for usage is one reason for evaluation besides others. The functions of enterprise evaluation differentiated by its causes are consultation, intermediation and argumentation (see Krag/ Kasperzak, 2000, p. 3). Talking about valuation of assets and “due diligence” in the case of the valuation of a whole enterprise one may be reminded of taxation or accounting as causes of valuation. This topic has to be responded to because of one inherent feature: evaluation for taxation is past-oriented (in the German case). Key figures deduced from balance sheets or volume of sales etc. mirror an expired period of which a certain probability of further development may be derived. Evaluations as the basis of economic decisions have to be forward-looking and therefore regard has to be paid to the individual enterprise’s situation and its environment. Because of shorter product-life-cycles, global competition, intensive marketing and long-run strategic planning, methods of value assessment based on former data are “misleading” (Born, 1995, p. 8).

3.2 Valuation of assets in the agri-food-chain

Most of the agricultural goods can be considered to be commodities. Hence a substitution of suppliers for downstream producers within the value chain is easily accomplished. As a result immaterial assets such as trademarks play a pivotal role for the ranking of enterprises in the food industry. The use of brand value measurement for external use can be distinguished by the means of different purposeful reasons (Havenstein/ Heiden, 2003, p. 1273):

- buy or sell of brands or trademarks (see Baumgarth, 2001, p. 229)
- mergers and acquisitions
- due diligence
- determination of license or franchise fees
- distraint / infringement of trademark
- accounting
- insolvency / liquidation

A meaningful example is the acquisition of the brand “Kraft” by Philip Morris in 1988. About half of the sum of 11.6 billion US-\$ was paid for the trademark “Kraft” itself besides tangible assets (ibid, p. 229). Such a market orientation in the valuation of assets on the base of economic decisions seems to be of special importance to the food industry. Here again the risk classification dilemma of systematic / unsystematic risk can be highlighted – on the one hand brand or

trademark valuation is strongly bound to the capital market (systematic risk) whereas the supply side valuation is bound to unsystematic risk particularly climate, geography, industrial land consumption, or land use competition.

This combination of risk and relationship valuation complicates strategy valuation within the agri-food-chain.

4. Concluding remarks: Differentiation within the evaluation of contract relationships

We have emphasized the need of a stronger integration of short- and long-run risk valuation methods so far. Scientific valuation methods may be used to evaluate strategic options of the participants within the agri-food-chain. In the next step the value of cooperation shall be accentuated. In the case of market orientation one entrepreneur has merely the ability to exchange risks: even if a market for weather insurances or certifications exists and no reluctance hinders market transactions this would just swap agricultural and financial (institutional) risk. The subprime credit crisis may be seen in this context.

Interacting with risk and contract relationships we do not want to focus solely on market relationships. Basically business-to-business (B2B) relationships in the form of fixed contracts e.g. in a vertical cooperation of a grain producer and a grain mill imply the risk set mentioned above. Co-operatives have to be seen in another respect: they don't comprise (merely) a capital driven interest of investors. They shall facilitate the co-operator's business entity by a mutual horizontal cooperation of the members. The worth of co-operation can be revealed e.g. by the worth of the scale-effect. Therefore it can be proposed to evaluate co-operatives with a "real option" that co-operators gain through joint purchase e.g. the option of reduced prices. Different case-studies on the effects of economies of scale and scope as well as the possible change in the flow of goods towards another value chain (vertical linkage) foster the argument to use market oriented valuation concepts (as in the case of due diligence) for the evaluation of a co-operative (see Brunner/ Voigt, 2008a,b). In so far the classical problem of business valuation in the case of co-operatives – the lack of a similar kind of equity as in investor oriented firms – could be bypassed: As long as "cooperation" exists as a mere process between entrepreneurs without a distinct business or enterprise (co-operative as a legal form), the member's value of cooperating has to be seen in the member's "real option" of joint purchase and the pecuniary advantage of the scale effect through this activity.

We want to emphasize the optional net worth of a co-operative as e.g. the cost reduction through joined purchase; the idea of starting this form of business relationship may be interpreted as economy of scope for the cooperating entrepreneurs – if it is prevailed through the joining of enough members for a critical mass, the economy of scale rent will reach the members. Second to none is the fostering of the member's business that can be evaluated by the discount for purchase by real option theory, whereas it is the member's decision to distribute the profits or to accumulate them in a legal form of a co-operative. This first economy of scope and the return of scale effects let the member's speculate for forthcoming economies of scope leading to further scale rents within the already existing cooperative.

As a solution for producers within the agri-food value chain we propose a differentiation of business between producers and their co-operative. Forasmuch they (the members) should invest in "their enterprise" – the co-operative – as the following link in the value chain to have two entities to spread the types of risk. Furthermore the value of the feasible strategies in the member's and co-operative entities may be functioning as argumentative value (see above).

Apart from this and due to the financial crisis the agri-food industry may be hit by further credit crunches on the part of banks or investors. Hence it should be within the interest of agri-food industrial entrepreneurs to evaluate the backlash of the development of financial markets on

their business, the triggering effects within other sectors and the linkages of the different value-chains of different branches – e.g. via the financial system or via a direct flow of goods.

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