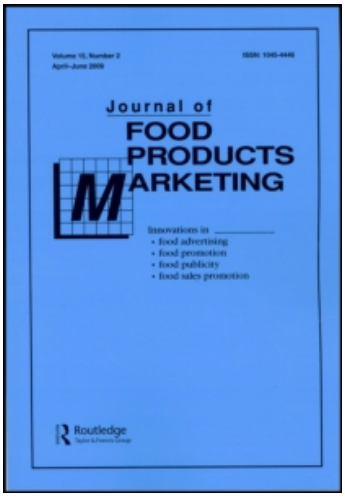

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Organic Supply Chain Collaboration: A Case Study in Eight EU Countries

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Organic Supply Chain Collaboration: A Case Study in Eight EU Countries

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This study aims at contributing to a better understanding of the linkage between supply chain performance and possible performance improvement with respect to food quality and safety. Therefore, the article addresses the question whether the level of collaborative planning and close supply chain relationships could help improve the quality and safety of organic supply chains. The study was conducted as part of the multi-disciplinary EU-wide survey of organic supply chains, carried out in eight European countries. In this article we report the results of the study regarding the structures and performance of six different organic supply chains in these eight European countries for: milk (CH, UK), apples (DE, CH), pork (UK, NL), eggs (DE, UK), wheat (HU, IT, FR) and tomatoes (IT, NL). In-depth interviews with key-informants were

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carried out in 2006 to investigate the structures, performance, and relationships within the supply chains. Results show a low level of collaboration among various actors especially in cost and benefit sharing. Highly integrated supply chains show higher collaboration especially in the domain of Decision Synchronization. Trust and collaboration appear to be related with increased performance, whereas the higher the perceived risk for quality and safety, the higher the probability of supply chain collaboration.

KEYWORDS supply chain management, organic food industry, food quality and safety, collaboration, trust, performance

INTRODUCTION

Supply chain management (SCM) does not only refer to efficient integration between buyers and suppliers in planning and implementing all activities involved in sourcing, producing, and logistics management (Lummus & Vokurka, 1999; Petersen, Ragatz, & Monzca, 2005). It also includes coordination and collaboration among all chain actors, including customers. The collaborative role of the supply chain members is of leading importance when a sustainable competitive advantage has to be obtained for all members of the chain[1].

Only a few studies describing the structures and performance of organic supply chains were conducted in the past (Higgins et al., 2008; Kottila and Rönni, 2008; Sage, 2003; Smith and Mansden, 2004; Wycherley, 2002). No study investigating the effect of supply chains on food quality and safety is available. Most of these studies report a number of issues concerning organic supply chain structure and performance:

- high operating costs;
- lack of alignment between supply and demand, poor reliability of supply;
- lack of collaboration among chain members;
- different values and motivation among different actors in the chain; and
- lack of information flow.

Members of organic food chains face several challenges in managing and linking profitability and the quality of the product (Zeithaml, 2000). The complex configuration of food chains and their actors complicates quality

[1] Noncollaborative behaviour—as will be briefly discussed further—may favour some members of the chain, generally the downstream ones (buyers).

assurance on the one side and the equitable and efficient allocation of costs and returns to the supply chain actors on the other (King and Venturini, 2005).

This paper analyses supply chain structures for selected organic commodities in Europe, and identifies the economic pressures in organic supply chains that impact food safety and quality. The overall aim of the research was to contribute to a better understanding of the supply chain performance and the collaboration system of the different organic supply chains, and specifically to investigate the effect of supply chain relationships on quality and safety performance.

The results are part of a larger study on organic supply chains as part of the EU-funded research project "Quality of Organic and Low Input Food" (QLIF – www.qlif.org).

METHODOLOGY

Theoretical Background

An agro-food supply chain consists of interdependent firms involved in the production and transformation of goods, services, and related information, as well as in the flow of these from farm to fork. Funds and other resources flow back from the end customers to the point of origin.

A closer relationship is supposed to help the chain members to (Lee et al., 1997):

1. achieve cost reductions and revenue enhancement; and
2. increase flexibility in dealing with supply and demand uncertainties.

These relationships can be based on trust, dyadic symmetry, and mutuality as well as on an imbalance of power within the supply-chain.

Some authors specifically consider power imbalance as detrimental to a sustainable business relationship (Doney and Cannon, 1997; Gummesson, 1999; Pole and Haskell, 2002), while others suggest that close cooperation helps the supply chain members to effectively match demand and supply to increase overall supply chain profitability (Simatupang and Sridharan, 2002). According to Petersen et al. (2005), effective collaborative planning is expected to improve supply chain performance by facilitating decisions that reflect a broad view of the supply chain and take into account interactions among the firms in the supply chain. Performance improvement might be expected in the form of increased inventory turns, better on-time delivery, improved responsiveness, better quality, reduced purchase prices, and/or reduced total cost. Christopher (1998) confirms the fact that supply chain performance depends on the quality of the relationships that extends from

upstream to downstream chain partners. Duffy and Fearne (2004) provided empirical evidence supporting the theory that partnerships can improve the performance of a firm.

These views are not shared by all. Campbell (1997) did not find any correlation between the buyer's trust in the supplier and the supplier's trust in the buyer, and suggested that other factors could explain successful relationships. Cox (1999) suggests that business is about selfishness and that companies are only successful when they possess power over someone or something. Palmer (2000, 2002), in his Darwinian approach to relationship marketing, illustrates the role of selfishness in buyer-seller relationships. These views essentially apply to supply-chain analysis, the maintained hypotheses borrowed from classical and neoclassical economics, starting with Adam Smith's "invisible hand." A similar conclusion, with regard to food supply chains, is reached by Hingley (2005, p. 856), who contends that "relationships in vertical supply channels (such as food) are often imbalanced and do favour the buyer."

Collaboration between members of a supply chain can take many forms. According to some authors, information management is crucial. Sharing relevant information is therefore an important form of cooperation. Information sharing is an essential element of inter-organizational relationships among the members of a chain (Anderson and Narus, 1990). Besides, the flow of information between the actors of a supply chain co-ordinates other flows, such as product flow (Coughlan et al., 2001).

Another important form is collaborative planning and decision making. Harrington (2000) cited a variety of potential benefits of collaborative planning, including reduced inventories, reduced transportation and distribution centre costs, improved cycle times and customer service, fewer emergency orders, and fewer backorders and returns.

The importance of trust in individual organisations has been illustrated by numerous authors (Araujo and Easton, 1996; Karahannas and Jones, 1999; Williams, 1997; Zaheer et al., 1998). Alvarado and Kotzab (2001) as well as Mentzer et al. (2001) see trust as a prerequisite for collaboration. To create trust and collaboration, supply chain actors need to consider the influence of their action not only on the adjacent actors, but on the relationships within the whole supply chain (Kottila and Rönni, 2008). Inter-organizational relationships are crucially affected by trust, even more than by technology (Welty and Becerra-Fernondez, 2001). Both the cognitive and the affective dimensions of trust have been investigated. The first is related to knowledge about previous facts that allows one to make predictions, that a supply chain actor (buyer/supplier) will stick to his or her obligations. The second is more related to a belief, a feeling of security and to the strength of the relationship. The confidence one places in a partner in this case is built on the basis of feelings generated by the level of care and concern the partner shows towards the actor (Johnson and Grayson, 2005). Other categorisations of

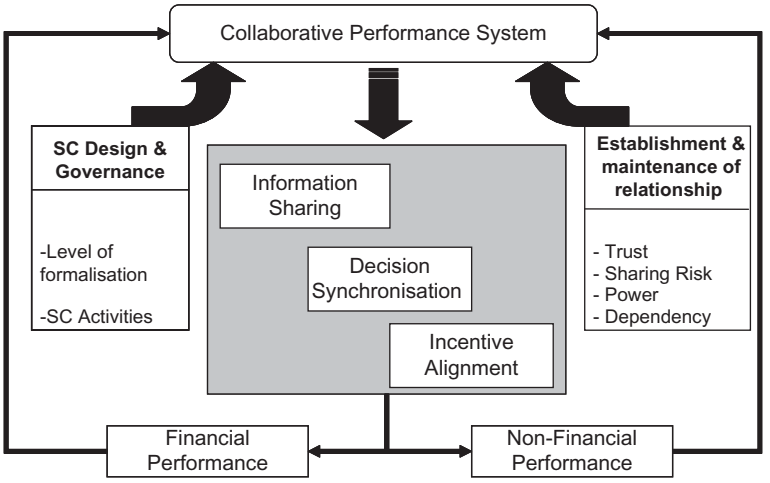

FIGURE 1 Framework for supply chain collaboration.

inter-organizational trust have been proposed in the supply chain literature (Mohtashami et al., 2003), but they all can be related back to those referred to above.

In our study on organic supply chain collaboration (see Figure 1), we consider two pillars which impact on supply chain collaborative performance systems (Matopoulos et al., 2007). The first pillar is related to the design and government of supply chain activities consisting of two elements: (1) the activities on which collaboration will be established, and (2) the level of formalisation of the collaboration. The second pillar concerns the establishment and maintenance of supply chain relationships. The elements here are trust, power and dependence as well as risk as a potential crucial factor guiding companies towards collaboration.

According to Simatupang and Sridharan (2004a), collaborative systems require the three dimensions of Information Sharing (IS), Decision Synchronisation (DS) and Incentive Alignment (IA), in order to facilitate the process of performance improvement within the supply chain.

For our study, we used the collaboration framework as outlined in Figure 1 in order to investigate cooperation among actors along the organic supply chain and its influence on performance. Following this framework, we have investigated supply chain relationships with respect to the following:

1. the areas of trust, perceived Risk (to food quality and safety) and level of formalisation, and their impact on collaboration dimensions; and
2. the impact of collaboration on financial and nonfinancial supply chain performance.

The quality of collaboration between the interviewed actors and their buyers and suppliers was investigated asking them how often they used to collaborate with their immediate downstream (upstream) supply chain members (buyers/suppliers) on some specific issues. Recent literature and expert assessment (academics and organic industry practitioners) were used to itemising the domains of each variable into a set of activities, reframing the collaboration index proposed by Simatupang and Sridharan (2004b) by reducing and adjusting the items used to tailor the organic case. Besides, the index was measured both with respect to the main buyer (downstream) and to the main seller (upstream). For each of the items, a 5-point Likert-scale was employed.

In our study, trust was measured via a 6-item scale, a reduced form of the scale used by Petersen et al. (2005). The Non-financial performance was measured by a 5-item scale including items about commitment, shared goals and external cooperation, chosen among those suggested by Fredendal, Hopkins, and Bhonsle (2005). Financial performance was measured by means of a simple statement on long-term profitability of the relationship regarding the immediate upstream and downstream partners. For each of the items, a 5-point Likert-scale was employed.

In the literature, the effect of supply chain relationships on quality performance has received little attention. Quality expectations is often seen as an antecedent to performance (Narasimhan and Nair, 2005). An exception is Fynes, Voss, and de Burca (2005) who has attempted to measure these effects by defining a supply chain relationship quality (SCRQ) construct and then measuring its impact on quality performance.

In this paper we used the adapted Simatupang and Sridharan's (2004b) collaboration index and Fredendal et al.'s (2005) model of collaboration, in order to measure—in the first place—the impact of collaboration on Trust and Financial and Non-financial performance. The Nonfinancial performance scale contained only one item related to safety and quality. Therefore, in order to further explore the impact of collaborative practices on organic supply chain quality and safety performance, we introduced two further scales related to quality and safety, based on assessment among organic experts from various disciplines:

1. the first one refers to 16 product attributes, which were rated either as weaknesses or strengths for the company in terms of quality and safety;
2. the second one is related to 15 quality and safety risk factors, rated on a 3-point scale (High risk, Low risk, No risk).

Finally, we measured the level of formalisation of the relationship between each company and the other supply chain members by two variables:

1. Companies can be integrated by ownership relationship: the respondent could either be owned or own another supply chain member: 18 companies out of 101 (17.8%) are integrated through ownership.
2. A weaker form of integration exists when long-term contracts are in place: 42 companies (41.6%) have long-term contracts either with upstream or downstream members or with both.

Based upon the existing knowledge and supply chain literature, we have developed the following hypotheses:

H1: The higher the level of formalisation of the supply chain relationship, the higher the collaboration.

H2: Higher trust will result in higher collaboration[2], which in turn will result in higher nonfinancial and financial performance.

H3: Higher collaboration will result in higher product quality and safety;

H4: Higher perceived risk for quality and safety will result in higher collaboration.

The various statements used to measure the latent constructs are reported in Appendix A.

EMPIRICAL SURVEY

A survey was conducted to assess the level of collaboration along the supply chains and its impact on performance and quality and safety of food products. Six different organic supply chains have been investigated in eight European countries for: milk (CH, UK), apples (DE, CH), pork (UK, NL), eggs (DE, UK), wheat (HU, IT, FR) and tomatoes (IT, NL). The supply chains were selected in order to achieve a balance between vegetable and animal production, as well as in relation with the specific relevance in each country.

As a first step, in-depth personal interviews were conducted with the key actors along the supply chain (producers, packers, processors, traders,

[2] It is often observed that formalised relationships (e.g., contracts) are required when the level of trust is low. This would imply a negative relationship between collaboration and formalisation and/or a negative relation between trust and collaboration. But contracts are a way to overcome the lack of trust only on occasional transactions, while in a supply-chain with frequent transactions you only formalise relationships with partners you trust. The authors wish to thank Professor. Donato Iacobucci for pointing out this issue.

retailers). The "snowballing" technique was used to select interviewees. Once a core company was selected along the chain (usually a manufacturer, processor, or packer), subsequent key informants were chosen from their main upstream and downstream partners, according to interviewees' indications.

A semi-structured questionnaire was developed to collect data. The questionnaire was pretested and refined in order to achieve scale validation (Churchill, 1979). A total of 101 companies were interviewed by 11 interviewers. Nonresponse was due to many factors, mostly confidentiality or firm policy. When more than one supplier/buyer was available for a given company, the second main one was interviewed. Across the sample, the respondents varied in terms of company types, legal status, number of employees, turnover, and years since conversion to organic as shown in Table 1.

About 30% of the respondents were retailers or distributors, while 30% were manufacturers, processors, or packers; the remaining 40% were primary producers, either single farmers (31%) or co-operatives/producers groups (12%). The average annual sales of the respondents were 969 million euros, although about half of the sample declared a turnover below five million euros. A little less than half of the sample had less than 20 employees, but 14% of the respondents declared more than 500 employees.

In Table 2 the cross-tabulation of the country and product types is reported. Each product type represented a whole supply chain in each country. The number of respondents per supply chain ranged from a minimum of 5 to a maximum of 11. The average number of supply chain members per national surveyed chain was 7.7.

In the second step, a web-based reduced questionnaire was administered to supply chain organic practitioners in Europe, in order to validate the qualitative study. A total of 111 returns were received from 1,500 e-mails (answer rate around 15%), but only 20 answers were complete and valid. Given the low number of responses, we cannot really consider our results fully validated, but the extra information did not refute the findings of the in-depth analysis.

OPERATIONALISATION OF SCALES

All the scales were tested for reliability by considering the internal consistency of the measures (Nunnally, 1978).

Cronbach's alpha reliability for all the Supply collaboration measures were 0.94 (upstream) and 0.93 (downstream): for the Information Sharing measures on their own 0.86/0.85, for the Decision Synchronisation ones 0.91/0.90, and for the Incentive Alignment ones 0.85/0.78.

TABLE 1 Descriptive Statistics of Respondents

	n
Firm type	
Distributor	10
Farmer	31
Manufacturer/Processor	22
Packer	5
Producer Groups	12
Retailer	21
Total frequency	101
Legal Status	
Individual company	19
Public limited company	14
Private limited company	48
Cooperative	8
Partnership	5
Other	7
Total frequency	101
Employees	
0–5	25
6–20	23
21–50	19
51–100	9
101–500	11
>500	14
Total frequency	101
Turnover (euros)	
0–500.000	21
500.001–1.000.000	8
1.000.001–5.000.000	24
5.000.001–10.000.000	4
10.000.001–50.000.000	19
>50.000.000	15
Total	91
Missing answer	10
Total frequency	101
Years since organic	
before 1991	33
1992–1999	42
After 2000	24
Total	99
Missing answer	2
Total frequency	101

Cronbach's alpha reliability for all of Fredendal's constructs was 0.90 (upstream) and 0.89 (downstream): for Trust on its own 0.93/0.92, for Nonfinancial performance 0.84/0.86. The reliability coefficient for the 16-item product quality and safety scale was 0.79, which becomes 0.81 when two items are deleted (Retail price, Low additive content). We therefore

TABLE 2 Supply Chain Membership per Country

	Product						
Country	Apples	Eggs	Milk	Pork	Tomatoes	Wheat (flour)	Total
France	–	–	–	–	–	7	7
Germany	8	7	–	–	–	–	15
Hungary	–	–	–	–	–	10	10
Italy	–	–	–	–	6	9	15
Switzerland	5	–	7	–	–	–	12
The Netherlands	–	–	–	9	11	–	20
UK	–	10	5	7	–	–	22
Total	13	17	12	16	17	26	101

consider the 14-item scale in the following. Finally, Cronbach's alpha reliability for the 15-item perceived risk scale was 0.76. All alpha levels are well above 0.70, which is considered the minimum acceptable level.

In order to perform the empirical analysis, two further indices were developed, as a combination of the previous ones. An overall collaboration index was developed as an average of the scores of the three dimensions of collaboration, following Simatupang and Sridharan (2004b). The correlation of three dimensions is significant at the 0.01 level; the correlation coefficients are: IS/DS (.84), IS/IA (.68), DS/IA (.81).

Similarly, the overall performance index represents the average of the scores of the non-financial and financial performance. Again, the correlation among the two dimensions is significant at the 0.01 level; the correlation coefficient is 0.68.

The two quality and safety scales cannot be meaningfully combined, since they represent different constructs. They appear to be significantly correlated (at the 0.01 level), although—as expected—the correlation coefficient is quite low (0.27).

RESULTS

This section presents findings from the survey that can be summarised into reasons for and level of collaboration, impact of level of supply chain integration on collaboration, impact of collaboration on trust and performance, and impact of collaboration on safety and quality.

Reasons for and Level of Collaboration

There were five top reasons for respondents to establish close supplier-retailer relationships, all in the Information-Sharing domain. In order of importance we can list: product quality, on-time delivery, product safety,

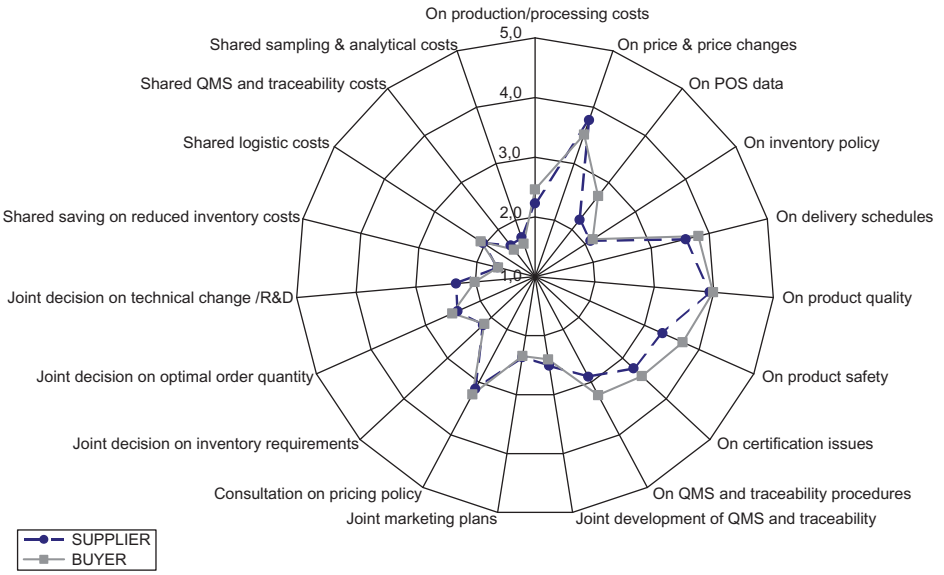

FIGURE 2 Average level of collaboration between organic supply chain actors (Scores: 1 = never; 2 = seldom; 3 = sometimes; 4 = often; 5 = always). (Figure appears in color in online version.)

prices and price changes, demand forecasts. They were substantially similar for both suppliers and buyers, with product safety coming one place ahead for sellers than for buyers, and both groups having price information at equal levels. It appears that the quality and safety issues, which are expected to be of great importance in organic supply chains, are indeed among the first three reasons to initiate collaboration. Among the more general SCM reasons, delivery scheduling appears to be the most important reason to cooperate.

The level of collaboration was measured with respect to the three dimensions proposed by Simatupang and Sridharan (2004a)—Information Sharing (IS), Decision Synchronisation (DS), and Incentive Alignment (IA). Figure 2 illustrates the score for all the items of the various dimensions.

While we found a high level of collaboration on information sharing with respect to prices, delivery schedules, product quality and product safety (represented on the right-hand side of the quadrant), the supply chains surveyed showed a very low level of collaboration with respect to incentive alignment and decision synchronisation (represented on the left-hand side). Indeed, there is almost no collaboration with respect to joint decisions on optimal order quantity and inventory requirements as well as for all cost relevant issues of the supply chain (analytic, traceability, logistics, inventory). Similarly, collaboration with respect to research and product development is very low.

Impact of Level of Supply Chain Integration on Collaboration

The level of collaboration was the same for all the three dimensions—Information Sharing (IS), Decision Synchronisation (DS) and Incentive Alignment (IA)—when the weaker form of integration was analysed. No difference existed between those companies having long-term contracts with other members of the supply chain and those who had not. Higher collaboration is not related to higher level of formalisation of the supply chain relationship.

On the other hand, those companies that exhibit the stricter form of integration (through ownership) are those where the DS dimension is rated at a higher level: the analysis of variance shows statistically significant differences at the 0.05 level. All other dimensions have higher but not statistically significant scores.

Nevertheless, when considering each dimension of the collaboration index separately, the level of integration seemed to have an influence. Joint decisions on product assortment, demand forecast, order exceptions, development of QMS and traceability, marketing plans, pricing policy, availability level, inventory requirements, optimal order quantity, technical change/R&D, and origin of raw materials are more likely to be made by highly integrated than non-integrated companies.

As a conclusion, the level of collaboration does not relate with the level of integration of the supply chain, unless the integration is achieved at the expenses of independence: when one firm is owned by either its supplier or reseller, then cooperation usually (but not always) takes place. Empirical evidence does not support hypothesis H1.

Impact of Trust and Collaboration on Performance

We have posited that trust is a prerequisite for collaboration and that a collaborative relationship will result in higher nonfinancial and financial performance. We have explored the impact of both the three dimensions of collaboration and the overall collaboration index on performance.

First of all, it is relevant to note that the upstream and downstream collaboration are not significantly different—in statistical terms—for all the three dimensions, while the respondents seem to trust the buyer more than the seller (*t*-test significant at the 0.05 level).

Interestingly, the three dimensions of collaboration and the collaboration index as well do not appear to be correlated with trust. However, both the trust scale and the collaboration index are significantly correlated with the performance scale, though performance (the way it has been measured in this study) cannot be solely explained by trust and collaboration. Indeed, regressing the overall performance scale on the trust scale and the collaboration index yields an R-square of 0.55, with both explaining variables highly significant.

The correlation between the trust scale and the overall performance index was 0.58 and significant at the 0.01 level. The coefficient of determination was 0.34, which indicates that the collaboration index accounts for only 34% in the variation of the performance index.

The correlation between the overall collaboration index and the overall performance index was 0.65 and significant at the 0.01 level. The coefficient of determination was 0.424, which indicates that the collaboration index accounts for only 42% in the variation of the performance index.

This does not change if we analyse separately the three dimensions of the collaboration index and the two dimensions of performance. The correlations are all significant at the 0.01 level but not particularly high.

In order to verify our findings, we have performed analysis of variance by partitioning the respondents in two groups according to the score in the overall collaboration index or the trust scale.

Those having a high collaboration index (more than 3) significantly outperformed respondents with a lower collaboration index in terms of their performance indices: overall, nonfinancial and financial. This finding suggests that respondents which have a higher degree of collaborative attitude may be able to attain better performance.

The ANOVA (analysis of variance) on the trust construct shows similar results for overall and non-financial performance but fails to show a significant impact on *financial* performance. In general the level of trust is quite low in all respondents (the average score is 1.86 and the maximum 3.79 when the potential maximum was 5). We can conclude for a lower explanatory power of the trust scale in explaining performance in organic supply chains.

Therefore, H2 hypothesis is not rejected in organic supply chains, though probably the trust effect on financial performance is not direct, but mediated by higher collaboration.

Impact of Collaboration on Safety and Quality

This section attempts to test hypotheses H3 and H4. There is no evidence of correlation between the overall collaboration index and the quality and safety performance index. This does not change if we analyse the three dimensions of the collaboration index separately.

Therefore we can conclude that higher collaboration does not mean higher organic product quality and safety. On the other hand, there is evidence that the higher the perceived risk for quality and safety is, the higher the probability that collaborative practices were in place.

The correlation between the overall collaboration index and the risk scale was 0.47 and significant at 0.01 level. The coefficient of determination was 0.23, which indicates that the collaboration index accounts for only 23% in the variation of the risk scale.

The three dimensions of collaboration exhibit the same level of significance but low correlation coefficients: IS (0.46) DS (0.41) IA (0.40).

In order to verify our findings, we have performed analysis of variance by partitioning the respondents in two groups according to the score in the risk scale.

Those having a high perceived risk for quality and safety (more than 15) significantly outperformed respondents with moderate-low risk perceptions in terms of their overall collaboration index, though most of this difference is accounted for by IS, while no significant difference between groups can be found for DS (only at 0.1 level) and IA. This finding suggests that perceived risk increases the collaboration but mainly on the Information Sharing area. When significant risk are perceived—in our case for product quality and safety—people engage in knowledge creation and sharing of information benefits (Done and Froblich, 2003).

DISCUSSION AND CONCLUSIONS

Operating costs covering manufacturing, inventory, logistic, and distribution costs cover approximately two thirds of the selling price of the organic commodities analysed in this study and represent according to Stolze et al. (2007) one of the most relevant financial weaknesses in organic supply chains in Europe. On the other hand, our study showed that collaboration between supply chain members aimed at reducing costs (or sharing benefits) is poorly developed. However, the pressure on operating costs limits the leeway for investments in product research and product development, which in turn are highly relevant to product quality. Investment in product development for quality improvements is one of the key issues to stay competitive and to keep market share. European organic supply chains analysed take little advantage of collaborative product development as a cost-reducing strategy. The differences between actual product development alliances in the food industry and theory on alliances in general, seem to rest in the chosen specific context. Companies in the food industry are not forced by external conditions to enter into product development alliances. Therefore, compared to other industries, motivations have to be stronger or risks smaller for them to form such inter-organisational relationships (Olsen et al., 2008).

Very close formalised supply chain relationships such as chain integration are desirable for improved chain performance. Despite this fact, supply chain actors do not look favorably on marketing chain integration. Reasons might be that they see it as impacting on their independence in running their business and that a significant proportion of actors do not see a lack of chain integration as adversely impacting on their business (Leat and Revoredo-Giha, 2008). Furthermore, building closer relationships even with important supply chain partners is difficult and resource-intensive (Dunne, 2008).

Closer relationships however were found for the collaboration dimension of Information Sharing with respect to delivery, prices, demand forecast as well as with respect to food quality and safety. As to the latter, an important driver towards closer collaboration relationships seems to be the actor's perceived risk: the higher the perceived risk, the closer the relationships are envisaged.

Supply chain collaboration has been receiving increased attention in recent years. Global competition has encouraged companies to develop close partnerships with suppliers and customers alike. At the same time, quality management has become widespread as part of the ordinary management toolkit for any company. The issue of quality, coupled with safety, is even more central in the food industry. In the marketing field, the focus on the traditional "Four Ps" of product, price, place, and promotion, has shifted to a more customer-oriented approach. There is now a changed perspective, where the role of "place" has been reviewed and is no longer only referred to as simple logistic and 'channel' operationalisation. Rather, the importance of relationship management is now more readily acknowledged, and companies realise that it is the supply chain and not the individual organisation that is the source of competitive advantage (Christopher and Lee, 2004).

According to Petersen et al. (2005), supply chain actors should recognise the difference between truly strategic suppliers and other suppliers. The results of our study suggest that collaboration and trust need to be further improved within the organic supply chains, particularly with the closest partners. In these strategic partnerships, the level of information sharing and joint decision making needs to be improved, while supply chain members should establish action steps to achieve targeted performance levels. For the supply chains analysed, this applies particularly to cost management, inventory planning, logistics and product development.

The results from our research confirmed that collaborative efforts along the organic supply chain enable the chain members to attain better performance. Nevertheless, the level of trust and collaboration is still too low. In the domain of quality and safety, it is forward-looking behaviour in the form of risk management that triggers enhanced collaborative practices. However, there is no evidence that collaboration actually improves product quality and safety.

The limitations associated with this study primarily relate to the case study nature of the approach taken, the supply chain actor's willingness to cooperate in research and the lack of a temporal dimension.

Data collection was made through in-depth semi-structured interviews which allowed detailed accounting of many real-life supply chains, thus increasing the validity of the results. Nonetheless, the results are of a qualitative nature and the attempt to collect more evidence by the use of a generalised quantitative survey failed, given the lack of incentives that companies have in disclosing supply chain relationship features. Even the

interviewing process was often at stake given the negative attitude the key actors (i.e. those who detain a substantial part of supply chain power, like processors or distributors/retailers) have towards research and researchers.

Moreover, there is a significant temporal dimension which we were not able to investigate in the course of this case study. Buyer-seller relationships usually develop through time. Therefore, a longitudinal study taking into consideration *how* collaboration increases or decreases through time could provide valuable contributions in theory development, while offering further managerial insights. Repeated measurements of the same companies would be particularly useful, while focusing on the same upstream and downstream partners.

Since our study was designed as a case study, the size of the sample, by limiting the degrees of freedom, did not allow for a cross-country or cross-product comparison of empirical findings in statistical terms. It would be interesting to investigate whether our findings were homogenous across the countries and/or products investigated.

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APPENDIX A

TABLE A The Collaboration Index

Information sharing
On demand forecast
On POS data
On price & price changes
On production/processing costs
On inventory policy
On supply disruptions
On order state or order tracking
On delivery schedules
On product quality
On product safety
On certification issues
On QMS and traceability procedures
Decision synchronisation
Joint plan on product assortment
Joint development of demand forecast
Joint resolution of forecast exceptions and/or on order exceptions
Joint development of QMS and traceability
Joint marketing plans
Consultation on pricing policy
Joint decision on availability level
Joint decision on inventory requirements
Joint decision on optimal order quantity
Joint decision on technical change /R&D
Joint decision on origin of raw materials
Incentive alignment
Joint funding on promotional programs
Shared saving on reduced inventory costs
Shared logistic costs
Delivery guarantee for peak demand
Allowance for product defects
Agreement on order changes
Shared QMS and traceability costs
Shared sampling & analytical costs

TABLE B Fredendal's Model Dimensions

Trust
I think the people in our supplier tell the truth in negotiations
I think that our supplier meets its negotiated obligation to our department
In my opinion our supplier is reliable
I feel that this supplier negotiates honestly
I feel that the people at this supplier will keep their word
I think that this supplier does not mislead us
I feel that this supplier does not try to get out of commitments
Non-financial performance
My supplier is knowledgeable about my business and product
One of the main advantages of this partnership is its stability
One of the main advantages of this partnership is its flexibility
Working together increases the quality & safety of our products
This partnership allows us to make long-term plans and investments
Working together improves the delivery of our orders
We are developing together product/process innovations
Financial performance
The long-term profitability of this relationship is higher in comparison to alternatives

TABLE C Product Quality and Safety Attributes (Rated as Weaknesses or Strengths)

Retail Price
Freshness
Ripeness
Shelf-life
Taste/Texture
Physical Appearance (colour, etc.)
Odour
Grade
Label
Packaging
Origin (Links to the territory of production/processing)
Produced with traditional methods & know-how
Certified quality standards
Low additives content
Nutritional content
Animal welfare

TABLE D Risks for Product Quality and Safety

Decreasing prices of product
Negative economic trend/cycle
Reduction of importance of Agriculture and Food Policy
Shortage of organic raw material
Product's undersupply
Increasing competition due to market globalization
Foreign trade barriers
Pesticide contamination (from conventional product)
GMO contamination
Animal diseases
Fraud & scandals in the organic market
Stricter food safety legislation of product
Safety of critical production/processing technologies
Adaptation of standard processing procedures to organic
Looser regulation on organic certification/labelling/inspection