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Agri-food chain relationships in Europe – empirical evidence and implications for sector competitiveness

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Abstract— The roles of business relationships in selected European agri-food chains are analysed. Using survey data from 1,442 farmers, food processors and retailers in two commodity sectors (meat and cereals) and across six different EU countries, we test the empirical relevance of several theory-based determinants influencing the choice of relationship type and the sustainability of inter-enterprise relationships. This is undertaken for the overall dataset and separately for different chain stages (farmer-processor versus the processor-retailer relationships), commodities and individual countries. Overall, we find that sector and enterprise-specific determinants seem to influence the choice of a certain relationship type while chain-internal, dyadic factors affect the sustainability of relationships. A logistic regression analysis reveals that the preference for a relationship type, while being highly chain-specific, depends on the long-term orientation and the strive for independence of an enterprise and the product-quality requirements within a corresponding market. As for the sustainability of the analysed relationships, structural equation modelling results suggest that its most important determinant is effective communication, with its two components, adequate communication frequency and high information quality, being equally important. The existence of personal bonds and an equal power distribution between buyers and suppliers are the second most important determinants, followed by the negative impact of key staff leaving. The analysis also reveals that the relative importance of these determinants differs significantly across the two considered chain stages and between the countries investigated. Agribusiness managers, seeking to improve their supplier or buyer relationships, need to consider the crucial role of effective communication and the positive contribution that the existence of personal bonds can make to the development and maintenance of sustainable interactions.

Keywords— business relationships, agri-food chains, competitiveness

I. INTRODUCTION

Today's business environment requires enhanced, national and/or international, co-ordination among raw material producers, intermediate manufacturers/processors and distributors. Thus, effective vertical, or 'chain' relationships are now considered a key source of competitiveness, sometimes referred to as 'collaborative advantage' or the 'competitive advantage of partnerships' [1]. Effective business relationships can help to reduce environmental uncertainty (e.g., by securing a more stable inflow of orders); contribute to better access to crucial resources (e.g., raw materials, capital, specialised skills); and/or result in higher business productivity (e.g., by enhancing loyalty among suppliers) [2].

Considerable research effort has already been undertaken to gain a better understanding of and thus enable a more effective management of business relationships [3], [4], [5], [6], [7], [8], [9], [10], [11], [12]. However, to date extensive cross-country research on the role of chain relationships and business-to-business (B2B) communication in the European agri-food sector has been scarce. While some research has been conducted for individual countries (e.g., [13]), successful improvement of chain relations and business communication across the EU agri-food system will depend on a thorough understanding of the current status quo and its key driving forces at a broader level. Without such in-depth assessment of the needs and constraints of the stakeholders involved, considering country-

commodity- and chain stage-specific particularities, no reliable recommendations for either business-strategy formulation or policy-making can be generated.

The objective of this paper is to test a set of hypotheses derived from both academic studies and knowledge gained from key informants in the sector. We present the results with regard to two main areas of interest. First, which factors influence the choice of agribusinesses with regard to a certain interaction type (i.e., in our case, formal versus non-formal relationships). Second, we investigate empirically the sustainability levels of inter-enterprise relationships in the analysed food chains and identify their main determinants.

The paper's structure is as follows. After a brief discussion of the theoretical background and the presentation of the specified research hypotheses, the methodology used for data collection and model estimation are described. Section four presents the obtained results. The last section discusses the findings and draws some conclusions.

II THEORETICAL FOUNDATIONS, HYPOTHESES AND DATA COLLECTION

Several theoretical approaches, ranging from socio-economic and institutional economics to business management theories, were investigated while building a theoretical framework for the research behind this paper.

Current frameworks for analysing vertical co-ordination in supply chains go back to early theories on relationship types originating from Coase ([14]) and later-on developed institutional economics (in particular, principal-agent theory, property-rights theory and transaction-cost theory). For instance, Mora and Menozzi ([15]) apply principal-agent theory to analyse the vertical contractual relations in the Italian beef agri-food chain. They reveal that food scandals have been a key driver for more contractual relationship types and that certificates signalling food safety pose a strategy to avoid adverse selection. Gorton ([16]) creates a typology of relationship types by producing a matrix of different strategic options of vertical co-ordination and relationship-specific characteristics (e.g., independence, exclusivity). He shows that relationships become more complex with

increasing level of formality and of vertical co-ordination. While price and supply and demand are at the core of spot market relationships, property rights, trust and negotiations increase with growing vertical collaboration. Williamson ([17]) identifies three governance structures: markets, hybrids and hierarchies and concludes that these three structures differ in contract law respects, the use of incentives and control instruments. Similar typologies have subsequently been used by other authors when analysing agri-food chains (e.g., [18]). We build upon Williamson's governance structures and broadly categorise two relationship types, formal and non-formal:

Non-formal relationship types:

- Spot, or 'open', markets (immediate transaction at actual prices).
- Repeated market transactions with the same buyer/supplier" with non-formal, non-written contracts.

Formal relationship types:

- Formal (written) bilateral contracts (contract terms and obligations are legally enforceable).
- Financial participation arrangements (both parties stay legally independent entities).

The sustainability (or 'goodness') of B2B relationships has not so much been a topic of the economics literature but has intensively been studied in the marketing and management field. Here, a common definition of business relationships is: "a series of commercial transactions and business-related interactions between a seller and a buyer which are not accidental. 'Not accidental' means that there are reasons for both parties which make a planned linking of transactions/interactions meaningful. It also means that there is an 'internal connection' between the transactions" ([19]). However, in this literature, until recently, there have been two main interest streams which either have analysed the quality of B2B relationship or their stability, but not both concepts together ([20], [21], [22]). Yet, sustainable business relationships can be characterised as a two-dimensional construct involving both relationship quality and relationship stability ([23]). Relationship quality represents the static component of a relationship and comprises inter-personal factors, such

as trust, commitment or satisfaction with a business partner. Relationship stability covers dynamic aspects (i.e., the evolution of repeated interactions and transactions over time) and considers non-coercive and coercive behaviour and past chain experiences. It may, indirectly, be measured by the existence of mutual dependence, the existing degree of conflict-resolution capacity and, more generally, a positive collaboration history with a business partner. Relationship quality and stability are interrelated and together form sustainable relationships. Thus, we use the expression ‘relationship sustainability’ as a meta-term encompassing both current quality aspects, and past development criteria.

When looking at factors which have been found in previous work to influence the choice of preferred relationship types with a supplier or buyer or which enable sustainable B2B relationships, a two-stage approach has been adopted. Following the literature review, a pilot study on business relationships in agri-food chains was conducted, based on expert interviews ([24]). This process involved interviews with key informants who mostly came from large companies and industry/trade associations and generally held senior management positions. The findings of both the literature review and the expert interviews provided evidence that cultural, economic and social determinants are considered vital for the choice as well as for the success of agri-food chain relationships.

The socio-economic and regulatory environment in which agribusinesses are embedded exerts a significant influence on chain relationships ([25]; [26]). In addition, the structure of the markets and competitive forces may affect both chain relationships and performance (e.g., [27]). Requirements on agribusinesses to produce goods with a specific quality level often originates from consumers demanding quality or sector-specific regulations protecting the public by establishing food-safety standards and traceability assurance systems. Agribusinesses must create a reputation of high product quality which requires long-term investments in product development, closer collaboration in labelling and creating contracts with suppliers to guarantee resources with a specific quality level ([28], [29]). Ranyaud et al. ([18]) review food-quality enforcement measures and its influence on the design of chain

relationships. They conclude that quality labels and enforcements lead to closer, more formal and collaborative relationships.

Besides sector-level factors this study also considers potential determinants at the enterprise level (general strategic orientation, e.g., a farm or firm’s desire for remaining independent, or adopting a long term-oriented decision-making approach) and chain-internal, dyadic variables (e.g., effective communication, equal power distribution between chain partners, the existence of personal bonds and the impact of key staff leaving a company).

Good communication can be seen as effective, formal and non-formal sharing of information between chain stakeholders. Low and Mohr ([30]) use the dimensions of relevance, accuracy, reliability and timeliness to characterise the quality of information. Other studies stress the importance of communicating at the right points of time. In the framework of this paper, we build on the previous findings and define good communication by using two indicators: ‘high information quality’ and an ‘adequate communication frequency’.

Tables 1 and 2 summarise the central hypotheses with regard to factors which may potentially influence the choice of relationship types and the sustainability of chain relationships.

Table 1 Summary of hypotheses (H) regarding determinants influencing the choice of relationship types[†]

| Sector-level Variables | Enterprise-level Variables |
|---|--|
| H1: High product-quality requirements in a relevant (sales or procurement) market (F) | H3: General strategic orientation of remaining independent as a company (NF) |
| H2: High competition in the relevant (sales or procurement) market (F) | H4: General strategic orientation of avoiding risks (F) |
| | H5: General strategic orientation of making long-term decisions (F) |

[†](F)/(NF) implies that it is assumed that the determinant leads to the use of more formal/non-formal relationships.

Table 2 Summary of hypotheses regarding determinants influencing the sustainability of economic relationships[†]

| Variables Specific to the Relationship with the Most Important Buyer or Supplier | Sector-level Variables |
|--|---|
| H6: Good communication (+) | H11: High competition in the relevant (sales or procurement) market (-) |
| H7: Used relationship type – contracts (+) | H12: High success uncertainty in the relevant (sales or procurement) market (-) |
| H8: Existence of personal bonds (+) | H13: Existence of traceability requirements in the relevant (sales or procurement) market (+) |
| H9: Equal power distribution (+) | |
| H10: Key staff leaving (-) | |

[†](+)/(-) implies that the determinant has a positive (negative) impact on the sustainability of the chain relationship.

To test our hypotheses presented in Table 1 and Table 2, we examine the relationship situation in five different EU countries (Germany, UK, Ireland, Finland, and Poland) for two different commodities (meat and cereals) and two different chain stages (upstream: farmers-processors and downstream: processors-retailers). The method of data collection differed across the collaborating countries. Overall,

most of the obtained samples were self-selecting, i.e., neither randomly drawn nor quota-based¹. The main contact method was the use of mailed questionnaires (together with follow-up phone calls and/or a subsequent mailing to remind participants). In some countries, personal interviews were conducted (mostly with farmers) or respondents were interviewed by telephone. In parallel, an online survey platform was established which was promoted using a wide range of public relation and marketing measures aimed at maximising the chances that relevant businesses would become aware of the survey and thus have the opportunity to take part. In addition, active collaboration with sector organisations and farmer/industry/trade associations was sought, which informed relevant farmers and companies. The subsequent analysis of the data obtained from the cross-country, multi-commodity survey of farmers, food processors and retailers is based on 1,442 usable responses.

III. EMPIRICAL RESULTS

A. Determinants of the choice of relationship types

The relationship types (RTs) chosen by the responding businesses shown in section II are classified in two categories: formal and non-formal RTs. The first (second) category consists of those respondents whose written contract and financial participation (spot market transactions or repeated market transactions) accounts for 60% or more of the purchasing value or turnover². A binary logistic regression model was estimated to analyse the determinants of the choice between formal and non-formal RTs.

Preceding the binary logistic regression analysis, some initial parametric tests were conducted to assess

¹ The Finnish samples were randomly collected.

² Respondents were able to choose more than one of the four RTs (spot, or 'open', markets; repeated market transactions; formal, written contracts; financial participation arrangements) and add a fifth RT as an open answer. In addition, respondents were asked to give the share of each chosen RT of their total annual domestic purchasing value or turnover in 2005

the relationships between potential explanatory variables and the dependent binary variable. To receive statistically more robust results, the agri-food chains have been aggregated into farmer-processor (F-P) and processor-retailer (P-R) chain stages. Analogously, the commodities of each country have been aggregated into bread, beer, beef and pig meat commodities.

Table 3 presents the RTs across the survey countries separately for the two chain stages. The responses from Germany and Ireland show similarities as formal relationships are more common in the P-R than in the F-P stage. As a counterpoint, Spain displays a different structure in the distribution of RTs because more than 90% of pig farmers state that they were vertically integrated. Formal relationships are most common in Finland compared to other survey countries. This holds for both chain stages. The responses from Poland and UK/Scotland show an analogous structure with non-formal relationships dominating clearly in both chain directions. However it should be noted that non-formal relationships in the UK may be quite close “partnership” type relationships. When testing for statistical dependence, using a bivariate Chi Square test, only for Spain and Germany a statistically significant relationship (at least 95% confidence level) between the two variables relationship type and chain stage was found.

Table 3 Percentage (and absolute numbers) of formal relationships[†] in selected EU countries

| Country | Chain Stage | | | |
|--------------|------------------|-------------------|--------------------|-----------------|
| | Farmer-processor | | Processor-retailer | |
| | % | (n/N) | % | (n/N) |
| Finland | 57.1 | (89/156) | 56.9 | (29/51) |
| Spain | 41.0 | (93/227) | 4.7 | (5/106) |
| Poland | 20.3 | (45/222) | 12.7 | (13/102) |
| UK/Scotland | 16.6 | (38/229) | 12.5 | (1/8) |
| Germany | 11.8 | (11/93) | 27.9 | (12/43) |
| Ireland | 3.3 | (4/123) | 22.2 | (6/27) |
| Total | 26.7 | (280/1050) | 20.6 | (66/337) |

[†]Formal relationships include formal written contracts and financial participation arrangements.

The use of formal relationships per commodity is presented in Table 4. The largest share of formal relationships can be identified in the pig-meat sector.

Nearly half of the pig meat sample uses formal RT in the F-P stage. The beer sector presents a lower share of formal RT in the F-P chain stage. However, comparing the pig meat sector to the beer reveals that in the beer chain, downstream relationships seem to be also more formalised. No big differences between upstream and downstream chain stages in terms of RT exist in the bread chain. Only the meat commodities display a statistically significant dependence between relationship type and chain stage. This result also holds for all observations taken together.

Table 4 Percentage (and absolute numbers) of formal relationships[†] in selected EU agri-food chains

| Commodity | Chain Stage | | | |
|--------------|------------------|-------------------|--------------------|-----------------|
| | Farmer-processor | | Processor-retailer | |
| | % | (n/N) | % | (n/N) |
| Pig meat | 50.5 | (186/368) | 18.8 | (28/149) |
| Beer | 44.6 | (37/83) | 53.8 | (7/13) |
| Bread | 15.2 | (36/237) | 18.8 | (18/96) |
| Beef | 5.3 | (19/357) | 16.9 | (12/71) |
| Total | 26.6 | (278/1045) | 19.8 | (65/329) |

[†]Formal relationships include formal written contracts and financial participation arrangements.

A binary logistic regression model was applied to estimate the factors that influence the choice between formal and non-formal relationships. The results are presented in Table 5 which displays the β estimates of the explanatory variables which indicate their effect on the odds that a formal RT is chosen instead of a non-formal RT. Negative (positive) estimates indicate that an increase of the value of the explanatory variable corresponds to decreasing (increasing) odds that a formal relationship is chosen instead of non-formal relationship. The binary model performs well. 63% of the formal RTs, 92% of the non-formal RTs and, overall, nearly 85% of the RTs are correctly classified by the model. Nagelkerke’s R^2 is 0.46 which is also rather high given cross-section data used.

To control for the observed heterogeneity between the different agro-food chains in the analysed countries, chain-specific dummy variables were specified. The Finnish sausage chain was selected to be the reference category because it possesses the highest share of formal RTs (nearly 75%) thus being a benchmark for other surveyed country-commodities.

All the individual estimates of these control dummies are statistically significant and negative indicating that it is less likely for businesses in all other country-commodities to choose a formal RT compared to the Finnish sausage chain. In particular, formal RTs are least likely in Spain's cereal and Ireland's pork chain (−6.06 and −4.91) followed closely by the beef chain in UK/Scotland (−4.63).

The positive estimated coefficient for the variable chain stage indicates that the likelihood of choosing a formal relationship type is higher (0.57) downstream than upstream in the chains. Retailers tend to choose more formal RTs with processors as compared to farmers, indicating that downstream businesses are more likely to co-ordinate and organise their relationships more systematically and in a standardised way. Only one of the hypothesised sector factors (quality orientation) and two of the enterprise-specific factors³ (independence and long-term orientation) (Table 5) has a statistically significant effect on the choice of RT. This means that only hypotheses H1, H3 and H5 have been corroborated. The more quality-oriented the market is, the more likely (0.11) companies will prefer to use a formal RT to legally secure their quality supply. In this case, contracts can be used to secure quality standards by offering options for legal enforcement. Longer-term oriented managers are more likely (0.41) to choose a formal RT. Long-term orientation enables businesses to create a reliable legal basis for planning and securing future supply or sales. Striving for independence reduces the odds (−0.42) of choosing a formal relationship type. Independent businesses prefer to transact without being formally bound to their exchange partner.

³ Respondents were asked their degree of agreement on a scale from 1 to 7, where 7 indicates the highest agreement to the statements: "Our company tries to remain as independent as possible", "Our company tries to conduct business on as long-term a basis as possible" and "Our company operates in a market segment where above-average product quality is important".

Table 5 Binary logistic regression results: estimated RT-choice parameters[†]

| Variables | Parameters (β) |
|---|------------------------|
| Constant | 0.142 |
| Chain dummy (reference: Finland, sausage): | |
| Spain, cereal | −6.056*** |
| Ireland, pig meat | −4.912*** |
| UK/Scotland, beef | −4.627*** |
| Germany, pig meat | −3.810*** |
| Poland, pig meat | −3.143*** |
| Poland, beef | −2.866*** |
| Germany, cereal | −2.649*** |
| Ireland, beef | −2.263*** |
| Finland, cereal | −1.378*** |
| UK/Scotland, cereal | −1.104*** |
| Spain, pig meat | −1.038*** |
| Chain-stage dummy: processor-retailer (reference: farmer-processor) | 0.570*** |
| Independence | −0.419*** |
| Long-term orientation | 0.413*** |
| Quality orientation | 0.114* |
| Model statistics: | |
| Percentage of formal RTs correctly predicted | 62.6 |
| Percentage of non-formal RTs correctly predicted | 92.4 |
| Overall percentage correctly predicted | 84.7 |
| Nagelkerke R ² | 0.455 |

[†]Formal (1) / Non-Formal (0); *** (**/*) statistically significant at the 1% (5%/10%); Sample size: 1,442 observations.

B. Determinants of sustainable chain relationships

The results across the analysed agri-food chains, countries, chain stages and relationship types on the perceived sustainability (quality and stability) of the 'most important' buyer or supplier relationship reported by the interviewed enterprises are provided. Hereafter, the main determinants of relationship sustainability (quality and stability) using a structural equation model (SEM) is presented.

The relationship-sustainability indexes are reported in Table 6 and 7 for the two different commodities/products (meat and cereals) and separately for the two chain stages (i.e., the farmer-

processor and processor-retailer relationships)⁴ and for the different analysed EU countries.

In the meat chain (Table 6), the relationship-sustainability indexes⁵ are higher in the downstream relationship than between farmers and processors. The differences between downstream and upstream relationships (across all countries) are statistically significant at the 99% confidence level (using a univariate ANOVA test).

Within the different countries, downstream relationships seem to be better perceived than upstream ones with the exception of Germany and the UK. In the upstream direction, Finland has the lowest relationship sustainability index and Germany has the highest. In the downstream, Poland's index is the highest and the ones of Germany and the UK the lowest. In both cases, these differences are statistically significant at the 99% confidence level.

⁴ The given scores are averaged across farmers and processors in the 'farmer-processor' relationship and across processors and retailers in the 'processor-retailer' relationship. While it is likely (and indeed the case) that upstream and downstream stakeholders rate the respective relationships differently, we decided to compare two aggregate chain-level relationships rather than four different stakeholders in order to derive more compact and structural results.

⁵ Respondents were asked to rate on a scale from 1 (very poor) to 7 (very good) their opinions on the following sentences related to the quality and strength of the most important relationship: "Our trust in this supplier/buyer", "Our commitment towards this buyer/supplier", "Our satisfaction with this buyer/supplier" and "Our collaboration with this buyer/supplier in the past". Based on the assessment, a relationship-sustainability index was calculated as an unweighted average of the obtained scores for the four individual components. Indexes were only calculated where valid data on each individual item were available.

Table 6 Relationship-sustainability indexes* in EU meat (beef, pig) chain relationships

| Country | Chain Stage | | | | | |
|--------------|------------------|------------|--------------|--------------------|------------|--------------|
| | Farmer-processor | | | Processor-retailer | | |
| | Mean | Std dev | (n) | Mean | Std dev | (n) |
| Germany | 5.8 | 0.8 | (23) | 5.2 | 1.6 | (10) |
| UK | 5.7 | 1.0 | (139) | 5.2 | 1.2 | (6) |
| Spain | 5.5 | 0.9 | (116) | 5.7 | 0.7 | (46) |
| Poland | 5.6 | 0.8 | (208) | 6.1 | 0.6 | (99) |
| Ireland | 5.3 | 1.2 | (113) | 6.0 | 0.6 | (27) |
| Finland | 5.1 | 1.0 | (71) | 5.3 | 0.6 | (9) |
| Total | 5.5 | 1.0 | (670) | 5.9 | 0.7 | (197) |

*Index score calculated on the basis of four individual components, each one measured on a rating scale (1 = very poor; 7 = very good).

In the cereal chain (Table 7), relationship-sustainability indexes are also relatively high, and again higher in the downstream direction. These differences are also statistically significant at the 95% confidence level. Relative to the meat chain, there are no significant differences between the two chain's relationship-sustainability indexes (neither overall nor individually for the two chain stages). This implies that, for the overall dataset at least, relationship sustainability only differs across chain stages but not between the two analysed commodities.

Relationships seem to be better between retailers and processors than between farmers and processors in all the countries except for Germany. In the upstream stage of the chain, the highest (lowest) relationship-sustainability indexes can be seen in the UK (Finland). In the downstream stage, relationships seem to be best in the UK⁶ and worst in Germany. In both cases, the differences are statistically significant at the 95% confidence level across countries.

⁶ The UK situation is only reflected by one observation and thus this finding is not reliable.

Table 7 Relationship-sustainability indexes* in EU cereals (wheat, barley and rye) chain relationships

| Country | Chain Stage | | | | | |
|--------------|------------------|------------|--------------|--------------------|------------|--------------|
| | Farmer-processor | | | Processor-retailer | | |
| | Mean | Std dev | (n) | Mean | Std dev | (n) |
| Germany | 5.8 | 0.8 | (59) | 5.6 | 0.9 | (28) |
| UK | 6.0 | 0.8 | (60) | 7.0 | – | (1) |
| Spain | 5.5 | 0.9 | (117) | 5.7 | 0.7 | (50) |
| Finland | 5.2 | 0.9 | (82) | 6.0 | 0.7 | (38) |
| Total | 5.6 | 0.9 | (319) | 5.8 | 0.8 | (117) |

*Index score calculated on the basis of four individual components, each one measured on a rating scale (1 = very poor; 7 = very good).

Overall, the results indicate that respondents evaluate their 'most important' business relationship as comparatively sustainable. This holds for all investigated EU countries, analysed commodities/products and chain stages. Differences in the relationship-sustainability indexes are generally small. Nevertheless, we find downstream relationships being generally better perceived than upstream ones, with the exception of Germany and the UK in the meat chain.

The determinants of sustainability in economic relationships in agri-food chains are investigated by pooling data from all the questionnaires into one single dataset given that relationship sustainability indexes are relatively similar across the analysed countries, commodities and chain stages. Then, to test the different hypothesised relationship sustainability determinants described in section II a SEM has been used.⁷ The advantage of using this statistical technique rather than classical regression analysis is that multi-component constructs can be empirically tested and that correlation structures among independent variables can also be analysed which allows for identifying important interdependencies among regressors.

⁷ We used the AMOS software package (version 6.0), with unbiased covariances as the input matrix. Missing values are present in our dataset and consequently maximum likelihood estimation was the preferred estimation method. We tested for univariate and multivariate normality of the key variables using standard routines; however, we did not find worrying deviations from these distributions.

First, a general structural equation model for the whole database was conducted. We present only the results for the best performing model found among many tested alternative specifications. Second, for this “best” model, separate analysis for the farmer-processor and processor-retailer relationship (across all countries), for each country, for each commodity and for formal and non-formal relationship types were conducted.⁸

Figure 1 displays the SEM estimation results for the whole database. The model fits the data quite well, with all goodness-of-fit measures above (below) the recommended acceptance levels. The deviation of the correlation structure as suggested by the specified model from the one observed in the data is not significant ($p = 0.069$), suggesting a very satisfying model fit.

⁸ Results are not presented due to space limitations. However, main important differences with general model findings will be pointed out later in this section.

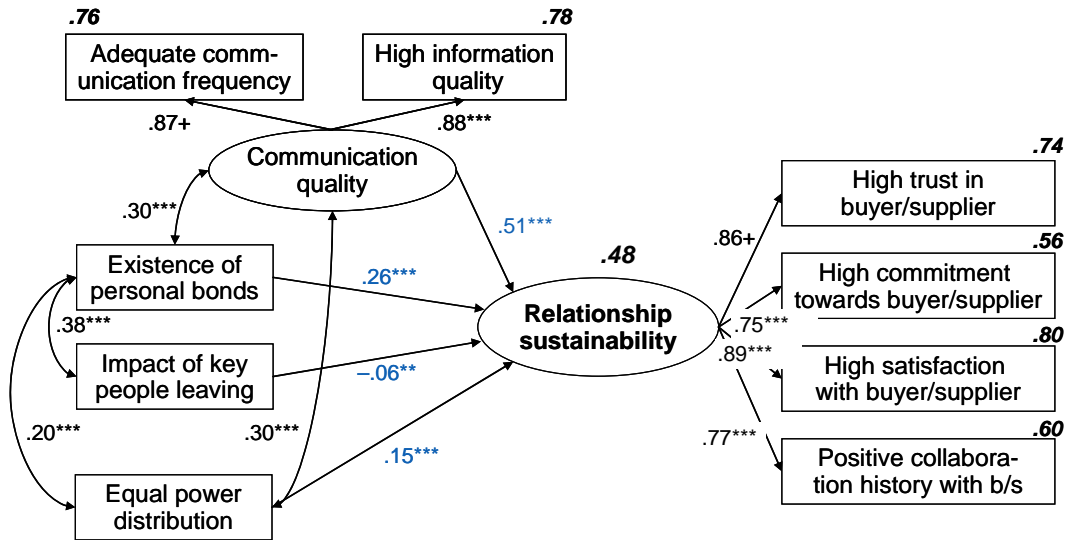


Fig. 1 Determinants of relationship sustainability – general SEM estimation results

Notes: .00 = standardized estimated parameters; *** (***) statistically significant at least at the 99% (95%) confidence level; + constrained parameter, no significance level available; .00 = squared multiple correlations (R^2); Model fit measures: CMIN/DF = 1.479 ($p = .069$); NFI = .994; RMSEA = .018; Sample size: 1,442 observations.

In the structural model, four variables have a positive and statistically significant impact on the relationship-sustainability construct: communication quality, the existence of personal bonds, the impact of key people leaving, and equal power distribution between buyer and supplier. This result confirms our hypotheses H6, H8, H9 and H10 described in Table 2 (section II). As for hypotheses H8, H11, H12 and H13, none of the corresponding variables had a statistically significant impact on relationship sustainability. The most important contributor to the sustainability of a business relationship is good communication (with a standardised regression weight of 0.51) measured as a two-component construct involving “adequate communication frequency” and “high information quality”. This is true for all countries, and in particular for Poland, the UK and Spain. Only in Germany and Ireland other determinants are more important: equal power distribution between buyers and suppliers and the existence of personal bonds for the former and the

existence of personal bonds for the latter. It was also found that communication quality is particularly important in the processor-retailer chain stage and in the meat chain. This outcome confirms the results of other researchers who see communication as the most important factor in achieving successful inter-firm co-operation [31], [32]. The

existence of personal bonds (0.26) is the second most important determinant for relationship sustainability. In Ireland, it is even the most crucial determinant and it is also highly positively correlated with communication quality, suggesting that the variable has an indirect impact as personal bonds seem to improve communication quality which in turn increases relationship sustainability. Equal power distribution between business partners (0.15) is the third most important determinant for relationship sustainability in the general SEM. It is in addition the most relevant in Germany and second most important in Finland, but it seems to have no relevance in Ireland and Poland. In addition, it does not seem to be important in formal business relationships. Finally, the factor of key people leaving has an impact, though to a lower degree (-0.06). The existence of personal bonds and the impact of key people leaving are positively and statistically significantly correlated with each other, suggesting that to a large extent key people are those who also develop personal bonds with business partners. However, this is not the case in Ireland (no significant correlation between the two variables), where key people must be important in some other way for the business relationship. In any case, the impact of key people leaving has been consistently estimated as being negative, but it is not always significant and generally low in magnitude. Thus, while this variable is of some importance in the general SEM, it is only significant in Ireland and

Finland, in the farmer-processor chain stage, the meat chain and in non-formal relationships.

Moreover, the existence of personal bonds, equal power distribution and communication quality are all positively and significantly correlated with each other. This suggests that the existence of personal bonds contributes to good communication, the equal power distribution contributes to the development of personal bonds and to good communication, and vice versa.⁹ Overall, 48% of the variance in the observed relationship-sustainability construct can be explained by the four identified determinants.

In the measurement models, the reflectively specified constructs 'relationship sustainability' and 'good communication' perform very well, with all factor loadings being above the recommended levels of 0.60 and all communalities also being equal or larger than 0.60 (except for the commitment item, which is 0.56). In the relationship-sustainability construct the most important components are satisfaction and trust. In the communication-quality construct both components, adequate communication frequency and high information quality, are equally important.

IV. CONCLUSIONS

The analysis indicates that both the preferred relationship types and sustainability of relationships in selected European agri-food chains can be explained systematically. For both phenomena, well-performing models have been presented which help to identify their main determinants. Overall, we find that sector and enterprise-specific determinants seem to determine the choice of a certain relationship type while chain-internal, dyadic factors affect the sustainability of relationships.

Regarding the determinants for the choice of relationship types between non-formal (i.e., spot markets or repeated market transactions) or formal

(i.e., written contracts or financial participation), the analysis revealed that, after controlling for heterogeneity across the different agri-food chains and chain stages, three factors are important. Formal relationships seem to be preferred by long term-oriented businesses or those which operate in quality-oriented markets. In contrast, those which strive for independence seem to prefer non-formal relationships. In recent years, EU policy has sought to increase the quality-orientation of agri-food chains. Moreover, the production of quality often requires considerable investment in staff skills, specialised plant and supporting infrastructure, thus requiring businesses to adopt a longer-term business approach. As formal business relationships are likely to be more difficult to build and manage, supporting agribusinesses via capacity-building and training measures related to topics such as collaboration development, relationship management and contract law may help to increase the economic sustainability and quality-orientation of EU agri-food chains.

As for the sustainability of relationships, our analysis clearly shows that good communication is crucial. This may be especially relevant for large businesses that are transacting with smaller enterprises. For example, good communication, offering real benefits to its recipients, could offset the negative effects for relationships that farmers perceive as a result of their customers' large scale and bargaining power. Moreover, where farmers can be organised into groupings (such as co-operatives or producer groups/clubs) that provide a feeling of enhanced market influence and facilitate communications, improved relationships may result. (However, strive for independence may be a barrier). This may be particularly relevant for those countries where the results of the analysis indicate that equal power distribution is an important lever for enhancing B2B relationships (e.g., Germany, Finland, Spain and the UK). The importance of personal bonds to relationship goodness, especially at the farmer-processor level, suggests that key staff retention is beneficial for chain relationships and that the employment of supply-chain staff who fit culturally and/or socially with those they transact with, may facilitate relationships. Finally, the fact that a high correlation exists between good communication, equal

⁹ For each variable, it has been tested whether the correlation path could be replaced by a structural regression path, thus turning for instance communication quality into a mediating variable. However, in each case the overall model fit deteriorated significantly thus rejecting such a specification.

power distribution between business partners and the development of personal bonds, indicates that these factors can be collectively regarded as part of the relationship building process, and that as such they should be developed together in major efforts to enhance inter-enterprise relations.

Agribusiness managers should consider these findings when aiming at choosing the most suitable relationship type with their buyers or suppliers and when trying to improve the sustainability of interactions with their business partners.

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