Relationship measures as indicators of chain performance: The case of the EU traditional food sector

Katrien Van Lembergen*, Adrienn Molnár, Xavier Gellynck

Ghent University, Faculty of Bioscience Engineering
Department of Agricultural Economics, Division Agro-Food Marketing
Coupure Links 653, B-9000 Ghent, Belgium
Tel: +32 9 264 59 46, Fax: +32 9 264 62 46

Katrien.VanLembergen@Ugent.be
Adrienn.Molnar@Ugent.be
Xavier.Gellynck@Ugent.be

∗Contact author

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Executive Summary

Organizations nowadays no longer compete as independent entities, but as chains (Lambert and Cooper 2000; Christopher 1998; Cox 1999). Hence, being part of a well-performing chain is crucial for the future of the individual food firm, especially in the context of the globalizing economy. As a result, understanding differences between low, medium and high performing chains is essential for the different chain members. The objective of this study is to measure and to identify the main determinants of traditional food chain performance. Therefore, quantitative data were collected via individual interviews with 271 chain members (91 suppliers, 91 focal companies and 89 customers) of 91 traditional food chains from three European countries (Belgium, Italy and Hungary), representing six different traditional food product categories (cheese, beer, ham, sausage, white pepper and bakery). The most discriminating determinant of low, medium and high performing chains is chain reputation. Governance structures (level of integration) although do not reveal any significant difference. These results are valid across member states, across product categories and across different sized chains. Future research should investigate whether the well-performing chains generate a sustainable competitive advantage over time. In addition, performance indicators can be enlarged with parameters other than economical ones such as ecological and social ones.

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Abstract

Being part of a well-performing chain is crucial for the future of the individual food firm. As a result, understanding differences between low, medium and high performing chains is essential for the different chain members. Therefore, the objective of this study is to measure and to identify the main determinants of traditional food chain performance.

Keywords

Chain performance, performance determinants, traditional food products

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Problem Statement and Objectives

Organizations no longer compete as independent entities, but as chains (Lambert and Cooper 2000; Christopher 1998; Cox 1999), and these organizations more and more realize the performance potential of chains (Pearson and Samali 2005; Gellynck, Vermeire, and Viaene 2006). Being part of a well-performing chain generates important performance benefits for the individual organization. As a result, there is increasing interest in the performance of chains as a research subject (Beamon 1998).

Adequate chain performance measurement identifies how well the chain is performing, draws attention to where improvements are possible, facilitates detecting problems and helps identifying where to focus on (Cohen and Roussel 2005). Consequently, it affects decision making through the assessment of past actions and through benchmarking (Aramyan 2007). Further, it can assist the distribution of resources, measure and communicate improvement towards strategic goals and assess managerial practices (Ittner and Larcker 2003). In addition, it helps managers to recognize good performance, to make tradeoffs between profit and investments, it provides ways to set strategic targets and enables managers to get involved if performance is distracting (Neely, Gregory, and Platts 1995).

Contrary to the raising awareness of the performance potential of chains, a vast group of authors (Neely et al. 1994; Neely, Gregory, and Platts 1995; Beamon 1998, 1999; Christopher 1998; Li and O'Brien 1999; Gunasekaran, Patel, and Tirtiroglu 2001; Gunasekaran, Patel, and McGaughey 2004; Lambert and Pohlen 2001; Van der Vorst 2000; Van Der Vorst 2006) endorse to the need of key issues to be addressed related to chain performance measurement. First, the quality of chain relationships, should be one of the central questions in chain performance measurement (Cousins and Hampson 2000; Molnár, Gellynck, and Felföldi 2007 ; Molnár, Felföldi, and Gellynck 2007) because of several reasons. Managers as well as practitioners believe in the importance of enhancing chain relationships and getting close to chain partners (Spekman, Jr, and Myhr 1998; Benton and Maloni 2005; Lambert and Cooper 2000), since flexible and successful chain relationships are the key success drivers in today's world of globalization (Mentzer et al. 2001). Successful and unique chain relationships hold the potential of being a source of competitive advantage (Barney 1991; Russo and Fouts 1997; Alvarez and Busenitz 2001; Coff 1999; Barney 2002; Lamming, Cousins, and Notman 1996; Gellynck 2006) and the ability to form valuable, compatible and complementary relationships is necessary to reach chain success (Quinn 2004; O'Keeffe 1998). This suggests that relationship measures should be included in chain performance measurement instrument as possible performance determinants. Still, relationship measures are not extensively included into chain performance measurement (Molnár, Gellynck, and Felföldi 2007). Second, with regard to measuring performance of chains active in the agri-business sector in general and in the traditional food sector in particular, literature points a number of additional problems over the already mentioned ones (Aramyan 2007). Many agro-food firms, including traditional food firms do not screen their performance in a regular way (Collins, Henchion, and Reilly 2001). Besides, chains belonging to different sectors may have different characteristics (e.g. chain length, the closeness of chain

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relationships, types of process links) (Lambert and Cooper 2000), which may influence their performance. Consequently chain performance measurement being carried out in other sectors might reveal differences as compared to performance measurement of traditional food chains.

Concluding, research on measuring performance of traditional food[1] chains[2] integrating relationship measures in the analysis deserves more attention. This is the rationale of our study being designed to fill these gaps by measuring traditional food chain performance and by identifying the main relationship measures discriminating between low, medium and high performing chains. Consequently, the objective of this study is to measure and to identify the main determinants of traditional food chain performance.

This paper is structured as follows: In the following part the procedures of the paper are presented. Next, the research results are discussed and finally conclusions are drawn as well as further research topics formulated.

Procedures

Research method and research sample

Quantitative data were collected via individual interviews with 271 companies belonging to traditional food chains across three European countries (Belgium, Italy and Hungary). In these countries traditional food subsectors were selected based on their socio-economic importance (Belgium: cheese and beer, Italy: cheese and ham, Hungary: white pepper, sausage and bakery). Next, traditional food producers (focal companies) were identified in each subsector and selected for interviews (details about the composition of the sample are provided in Appendix 1). During the interviews, each of the focal company was asked to identify suppliers and customers. In the next phase, one supplier and one customer of each producer were selected and interviewed. In this way, a total of 91 traditional food chains (including 91 suppliers, 91 focal companies and 89 customers) were contacted. There were two times two firms with the same customer, so there needed to be interviewed 89 customers instead of 91. The interviews have been carried out between December 13, 2007 and June 20, 2008.

Measurement and scaling

To measure traditional food chain performance, respondents (suppliers, focal companies, customers) are asked the extent to which they agree or disagree with 11 statements about five main areas of chain performance using a seven-point response scale ranging from completely disagree (1) to completely agree (7). The 11 statements and the five main areas of traditional food chain performance have been selected at the previous stage of the research by Gellynck et al. (2008). The five main areas of traditional food chain performance are: 1) Traditionalism, 2) Efficiency, 3) Responsiveness, 4) Quality and 5) Chain balance. Given the multi-dimensional

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[1] The definition of traditional food products involves four dimensions: (1) local production; (2) authenticity of the product; (3) 50 years commercial availability; (4) association with gastronomic heritage (Truefood, 2006).

[2] Within the context of the current paper the chain definition developed by Mentzer et al. (2001) is followed, namely a chain consists of a focal company, a supplier, and a customer involved in the upstream and/or downstream flows of products, services, finances, and/or information;

character of the five main areas, all include several performance indicators (several statements) (Gellynck, Molnár, and Aramyan 2008). Each focal company answered the statements related to their individual suppliers and customers. The same statements are used in the questionnaire of the suppliers and the customers but in relation to the focal companies. Details about the statements measuring chain performance are provided in Appendix 2. A higher agreement of the focal company on the statements related to the individual suppliers/customers corresponds with a higher performance and vice versa. The total chain performance includes four dimensions and is computed as the mean of all individual performance scores (Table 1).

Table 1: Dimensions of total chain performance score

Total chain performance
DIMENSIONS:
1) Perceived supplier's contribution to focal company's performance
2) Perceived customer's contribution to focal company's performance
3) Perceived focal company's contribution to supplier's performance
4) Perceived focal company's contribution to customer's performance

In order to find out the main relationship measures discriminating between high, medium and low performing chains, respondents were probed for their perception of their chain relationships. Suppliers, focal companies, customers are asked the extent to which they agree or disagree with 20 statements about eight relationship measures using a seven-point response scale ranging from completely disagree (1) to completely agree (7). 1) Trust, 2) economic satisfaction, 3) social satisfaction, 4) dependency, 5) non-coercive power, 6) coercive power, 7) reputation, 8) conflict are the integrated relationship measures. The above relationship measures are adapted from Dwyer (1980), Anderson and Narus (1984), Skinner el al. (1992), Ganesan (1994), Doney and Cannon (1997), Jonsson and Zineldin (2003) and Batt(2004). Again, these statements were presented to the focal companies and their individual suppliers and customers. The focal companies answered the statements related to their suppliers and customers. The same statements are used in the questionnaire of the suppliers and the customers but in relation to the focal companies. Details about the statements measuring chain relationships are provided in Appendix 3. A higher agreement of the focal company on the statements related to the individual suppliers/customers corresponds with a higher quality relationship between the focal company and the individual suppliers/customers and vice versa. The total chain trust, total chain economic satisfaction, total chain social satisfaction, total chain dependency, total chain non-coercive power, total chain coercive power, total chain reputation, total chain conflict is computed as the mean of all scores similarly to total chain performance and each has for dimensions (Table 1).

Besides the above relationship measures, the choice of governance structures is also assessed, as a discriminating variable between high, medium and low performing chains. Gellynck and Molnár (2008) developed a theoretically-grounded and empirically-tested taxonomy of governance structures serving as a base for our analysis. This taxonomy relates, identifies and understands seven governance structures which are determined by the level of integration. The seven governance structures (levels of integration) are the following: spot market, non-contractual relationship with non-qualified partner, non-contractual relationship with qualified partner, contractual relationship, relation-based alliance, equity-based alliance and vertical

integration (Raynaud, Sauvee, and Valceschini 2002; Jagdev and Thoben 2001; Peterson, Wysocki, and B. 2001; Webster 1992; Humphreys, Shiu, and Lo 2003; Steele and Beasor 1999; Mair; Davies 2000; Van der Vorst et al. 1998; Lu, Trienekens, and Omta 2006; Szabó and Bárdos 2006; Claro, Hagelaar, and Omta 2003; Trent 2005; Gardner, Cooper, and Noordewier 1994; Gellynck and Molnár 2008; Raynaud, Sauvee, and Valceschini 2005). In this paper, the seven governance structures (level of integrations) are given a rising number from 1 to 7, where 1 represents spot markets and 7 represents vertical integration. The statements (key determining variables) of the seven governance structures (levels of integration) are presented in Appendix 4. Focal companies are asked to choose one of the seven statements characterizing the best their relationship (level of integration) with their individual suppliers and customers and vice versa. In case of mismatch between the choices of governance structure (level of integration) of the focal company towards the individual suppliers/customers and vice versa, answers representing the higher levels of integration are taken into account.

Analysis

The investigated chains (representing answers from one focal company and its individual suppliers and customers) are classified as high, medium or low performing chains by a tertiary split of the total chain performance score. Significant differences between the high, medium and low performing chains are analyzed for the relationship measures and governance structures by using Kruskal-Wallis test followed by post-hoc Mann-Whitney U tests whenever the Kruskal-Wallis test yields a statistically significant result. Further significant differences are analyzed for sample characteristics by conducting Crosstabs.

Results

The individual performance scores are aggregated into chain performance scores. It results in 91 cases or chains. A tertiary split (comparing top third, middle third and bottom third of sample) is used to split the data to ensure discrimination between the groups.

To identify the variables being linked to total chain performance, Kruskal-Wallis test is conducted followed by Mann Whitney U test. Low, medium and high performing chains show significant differences regarding all the relational measures (trust, economic satisfaction, social satisfaction, dependency, non-coercive power, coercive power, reputation, and conflict) but not for the governance structure (level of integration) (Table 2).

Table 2: Relationship measures for low, medium and high performing chains: mean scores (mean) and standard deviations (SD)

Performance	Low n=31	Medium n=30	High n=30	Sample n=91
Relationship measures on chain level	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Trust[1]	5,55 (0,55)a	5,74 (0,64)a	6,33 (0,34)b	5,87 (0,62)
Economic satisfaction[1]	4,85 (0,68)a	5,28 (0,66)b	5,57 (0,67)b	5,23 (0,73)
Social satisfaction[1]	4,48 (0,86)a	5,05 (1,07)b	5,28 (1,05)b	4,94 (1,04)
Dependency[1]	3,40 (0,82)a	3,86 (0,82)b	3,98 (0,82)b	3,75 (0,85)
Non-coercive power[1]	3,00 (0,85)a	3,61 (0,83)b	3,88 (1,17)b	3,50 (1,02)
Coercive power[1]	3,55 (1,50)b	2,85 (1,27)a,b	2,60 (1,30)a	3,00 (1,40)
Reputation[1]	5,31 (0,63)a	5,74 (0,72)b	6,29 (0,55)c	5,78 (0,75)
Conflict[1]	3,13 (1,03)b	2,70 (1,28)a,b	2,15 (1,00)a	2,66 (1,17)
Governance structure (level of integration)[2]	2,83 (0,73)	3,01 (0,58)	3,03 (0,62)	2,95 (0,65)

[1]Seven-point Likert scale: 1 = completely disagree; 2 = moderately disagree; 3 = slightly unimportant; 4 = neither agree nor disagree; 5 = slightly agree; 6 = moderately agree; 7= completely agree; [2]Seven-point scale representing the degree of integration 1= not at all integrated, 7= fully integrated; Different letters (a-b-c) indicate significantly different average scores using Mann-Whitney U test; Low=low performing chains, Medium=medium performing chains, High=high performing chains.

Global results indicate that traditional food chains are characterized by high levels of trust and reputation. It might be linked to the fact that relationships in traditional food chains already exist for a long period and to the fact that in many chains personnel contact between focal companies on the one hand and suppliers and customers on the other are the dominant business relationship. In addition, a fairly high score is obtained for economic satisfaction.

In line with the expectations low and medium performing chains score significant lower than high performing ones on trust (p=0,00, p=0,00). Further, economic satisfaction (p=0,02, p=0,00), social satisfaction (p=0,02, p=0,00), dependency (p=0,02, p=0,01), non-coercive power (p=0,01, p=0,01) delineate differences between low and medium performing chains on the one hand, and between low and high performing chains on the other hand. In the same time, the results uncovered significant negative relationship between performance and coercive power as well as between performance and conflict. This significant negative relationship results in a difference between low (p=0,01) and high (p=0,01) performing chains. Last, the study determines a link between reputation and performance, resulting in a significant difference between low versus medium (p=0,010), between low versus high (0,000) and as well as between medium versus high performing chains (0,003). As a result, the relationship measure showing the largest discriminating power between the three performance groups is reputation. It means that

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traditional food chains composed of chain members having a highly appreciated business reputation score the best. A striking finding relates to the fact that within the context of our sample, no relationship can be identified between the governance structure (level of integration) and performance. It means that fully vertical and financial integration as the one extreme on the scale do not necessarily generate better results and vice versa. All types of relationships, structured both in a formal and informal way, might generate success or failure. This finding is contrary to the assumptions of Gellynck and Molnár (2008), expecting that chains realize enhanced performance by being integrated.

Concluding, this outcome is in line with the results of Fines et al. (2005), Yang et al. (2008) and Yang (2009). Fines et al. (2005) showed that relationship quality has a positive impact on the supply chain performance. Also Yang et al. (2008) proved the positive effect of relational stability on the performance of the supply chain. In addition, Yang (2009) provided evidence for the significant impact of relationship characteristics on the supply chain performance. However, Yang et al. (2008) and Yang (2009) studied buyer-supplier relationships and Fines et al. (2005) studied relationships between three parties (relationship of manufacturing companies in the electronic sector with supplier and customer). Our paper studies multiple individual chains therefore it goes beyond the scope of the above articles.

Table 3 examines possible links between some sample characteristics and performance. The figures reveal no significant differences between origin, sector and company size. It means that these characteristics or variables do not help explaining performance differences in the traditional food sector.

Table 3: Socio-demographic differences between low, medium and high performing chains; percentages

Performance	Low n=31	Medium n=30	High n=30	Sample n=91	
Sample characteristics	Percentages	Percentages	Percentages	Percentages	Statistics
Country					
Italy	30,0	32,2	40,0	34,0	P=0,14 Cramer's V=0,14
Hungary	20,0	41,9	36,6	32,9	
Belgium	50,0	25,8	23,3	32,9	
Product type					
Dried sausage	16,6	16,1	3,3	12,0	
White pepper	0,0	3,2	13,3	5,4	
Cheese	40,0	35,4	26,6	34,0	
Beer	30,0	6,4	13,3	16,4	P=0,2 Cramer's V=0,2
Ham	10,0	16,1	23,3	16,4	
Bakery	3,3	22,5	20,0	15,3	
Size of FC					
<=10 employees	56,6	38,7	41,3	45,5	P=0,36 Cramer's V=0,36
11-50 employees	20,0	32,2	41,3	31,1	
51-250 employees	23,3	29,0	17,2	23,3	

Significant difference calculated using Crosstabs

Conclusions

In the frame of our paper, we measured traditional food chain performance and identified the main relationship measures discriminating between low, medium and high performing chains. It is realized with the help of quantitative data collected via individual interviews with 271 chain members representing 91 traditional food chains from three European countries representing six different traditional food product categories.

The comparison of low, medium and high performing chains identifies that the most discriminating determinant of performance is chain reputation. Further, governance structures (levels of integration) do not reveal any significant difference. Country-, product-, or size-specific differences are not related to this result, which allows us to make wider generalization of the results.

Future research should investigate whether the well-performing chains generate a sustainable competitive advantage over time. In addition, performance indicators can be enlarged with parameters other than economical ones such as ecological and social ones.

Appendix 1: Sample description

Country/product/ chain/respondents	Chain member	Size
ITALY: HAM	15 S	Micro: 3, Small: 5, Medium: 16, Large: 1
15 CHAINS	15 FC	Micro: 6, Small: 7, Medium: 1, Large: 1
43 RESPONDENTS	13 C	Micro: 2, Small: 6, Medium: 5, Large: 0
ITALY: CHEESE	16 S	Micro: 10, Small: 6, Medium: 0, Large: 0
16 CHAINS	16 FC	Micro: 13, Small: 2, Medium: 1, Large: 0
48 RESPONDENTS	16 C	Micro: 11, Small: 5, Medium: 5, Large: 0
HUNGARY: DRY SAUSAGE	11 S	Micro: 2, Small: 2, Medium: 7, Large: 0
11 CHAINS	11 FC	Micro: 2, Small: 3, Medium: 16, Large: 0
33 RESPONDENTS	11 C	Micro: 1, Small: 3, Medium: 7, Large: 0
HUNGARY: WHITE PEPPER	5 S	Micro: 3, Small: 1, Medium: 1, Large: 0
5 CHAINS	5 FC	Micro: 1, Small: 2, Medium: 2, Large: 0
15 RESPONDENTS	5 C	Micro: 4, Small: 1, Medium: 0, Large: 0
HUNGARY: BAKERY	14 S	Micro: 2, Small: 7, Medium: 5, Large: 0
14 CHAINS	14 FC	Micro: 0, Small: 7, Medium: 7, Large: 0
42 RESPONDENTS	14 C	Micro: 8, Small: 3, Medium: 3, Large: 0
BELGIUM: BEER	15 S	Micro: 4, Small: 7, Medium: 1, Large: 3
15 CHAINS	15 FC	Micro: 8, Small: 5, Medium: 2, Large: 0
45 RESPONDENTS	15 C	Micro: 9, Small: 5, Medium: 0, Large: 1
BELGIUM: CHEESE	15 S	Micro: 7, Small: 4, Medium: 2, Large: 2
15 CHAINS	15 FC	Micro: 11, Small: 2, Medium: 2, Large: 2
45 RESPONDENTS	15 C	Micro: 4, Small: 5, Medium: 2, Large: 0
TOTAL	91 S	Micro: 31, Small: 32, Medium: 22, Large: 6
	91 FC	Micro: 41, Small: 28, Medium: 21, Large: 1
	89 C	Micro: 39, Small: 28, Medium: 17, Large: 5

Micro: Micro sized enterprise: < 10 employees, Small: Small sized enterprise: < 50 employees,
Medium: Medium sized enterprise: < 250 employees, Large: Large sized enterprise: > 250 employees;
Respondents (chain members): S=Supplier, FC=Focal company, C=Customer

Appendix 2: Five main areas of traditional food chain performance and the 11 corresponding statements

1) **Traditionalism**
   - Authenticity: Doing business with our supplier/customer is crucial in maintaining the authenticity of our products
   - Gastronomic heritage: Doing business with our supplier/ customer helps my company to be part of the gastronomic heritage
2) **Efficiency**
   - Logistic cost: Doing business with our supplier/ customer helps my company to lower logistic costs significantly
   - Profit: Doing business with our supplier/ customer helps my company to maintain acceptable profitability
3) **Responsiveness**
   - Lead time: Doing business with our supplier/ customer helps my company to reduce lead time (time from sending/getting the request till reply)
   - Customer complaints: Doing business with our supplier/ customer contributes to avoid (customer/consumer) complaints
4) **Quality**
   - Safety: Doing business with our supplier/ customer helps my company to manage product safety
   - Attractiveness: Doing business with our supplier/ customer helps my company to produce more attractive products
   - Environmental friendliness: Doing business with our supplier/ customer helps my company to manage environmental friendliness
5) **Chain balance**
   - Distribution of risks and benefits: Doing business with our supplier/ customer contributes to a more balanced distribution of risks and benefits along the chain
   - Chain understanding: Doing business with our supplier/ customer helps my company to better understand other chain members' interests

Appendix 3: Eight relationship measures and the 20 corresponding statements

1) **Trust**
   - Our supplier/ customer keeps promises
   - Our company has high confidence in our supplier/ customer
   - We believe that the information our supplier/ customer provides us is correct
   - Our supplier/ customer considers how its decisions/ actions may affect us

2) **Economic satisfaction**
   - Our business relationship with our supplier/ customer significantly contributes to our profitability
   - Our business relationship with our supplier/ customer is very attractive because of getting fair prices

3) **Social satisfaction**
   - Our supplier/ customer hardly considers our arguments when changing prices
   - Our supplier/ customer leaves our company in the dark about what we ought to know

4) **Dependency**
   - Our company is not significantly dependent on our supplier's/ customer's resources (e.g. raw materials, packaging machines, transport facilities)
   - Our company is significantly dependent on our supplier's/ customer's capabilities (soft skills, such as expertise)
   - Our company can easily replace our supplier/ customer

5) **Non-coercive power**
   - Our company receives benefits from our supplier/ customer when we regularly meet their needs /requirements (technical support/ free advice/ financial support/ market information etc.)
   - Our supplier/customer rewards our company without requiring specific behavior in return (technical support/ free advice/ financial support/ market information etc.)

6) **Coercive power**
   - We can be sure that our supplier/customer will not retaliate our company when we do not accept our suppliers' / customers' business proposal (keep back important information / terminates contract, press down price, etc)
   - We can be sure that our supplier / customer will not neglect our interests even if we fully meet the conditions detailed in the contract with our supplier / customer (keep back important information / terminates contract, press down price, etc)

7) **Reputation**
   - Our supplier/ customer is well-known for caring about its business partners
   - Our supplier/ customer is well-known for its expertise
   - Our supplier/ customer is well-known for its accuracy

8) **Conflict**
   - We disagree with our supplier/ customer on critical issues
   - Our business interest doesn't match with that of our supplier/ customer

Appendix 4: Seven governance structures with the corresponding statements

Level of integration

1) **Spot market**

   When our company does business with our supplier/ customer each transaction (price, quantity, quality etc) is negotiated individually

2) **Non-contractual relationship with non-qualified partner**

   Doing business with our supplier/ customer is based on trust and it is not a prerequisite that we know in advance whether our supplier has a qualification/third party certification

3) **Non-contractual relationship with qualified partner**

   Doing business with our supplier/ customer is based on trust but it is a prerequisite that we know in advance whether our supplier has a qualification/third party certification

4) **Contractual relationship**

   Our relationship with our supplier/ customer is based on a written contract (price, quality, delivery time, etc)

5) **Relation-based alliance**

   Our company and our supplier/ customer develop common business ideas

6) **Equity-based alliance**

   Our company and our supplier/ customer combine resources (human, financial etc) in joint projects

7) **Vertical integration**

   Our company and our supplier/ customer are fully integrated (financial, organizational)

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