Performance imbalances in the chain: EU traditional food sector

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Abstract: Organizations nowadays no longer compete as independent entities, but as chains (Christopher, 1998; Cox, 1999; Lambert and Cooper, 2000). 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, the objective of this study is to identify performance imbalances of traditional food chains. 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 results differentiate six different kinds of chain imbalances, namely: dyadic upper and lower, up- and downstream, internal and external indicate both dyadic and chain-wise imbalance. Most chain imbalances are noticed in relation to lowering logistic costs and to reducing lead time. Future research should extend the list of performance indicators with parameters other than economical ones such as ecological and social ones.

Key words: Chain performance, imbalances, traditional food products

1 Introduction

Organizations no longer compete as independent entities, but as chains (*Christopher,* 1998; *Cox,* 1999; *Lambert and Cooper,* 2000), and these organizations more and more realize the performance potential of chains (*Gellynck* et al., 2006; *Pearson and Samali,* 2005). 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,* 1998a).

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* et al., 1995).

Contrary to the raising awareness of the performance potential of chains, a vast group of authors (*Beamon,* 1998b; *Beamon,* 1999; *Christopher,* 1998; *Gunasekaran* et al., 2004; *Gunasekaran* et al., 2001; *Lambert and Pohlen,* 2001; *Li and O'Brien,* 1999; *Neely* et al., 1995; *Neely* et al., 1994; *Van der Vorst,* 2000; *Van Der Vorst,* 2006) endorse to the need of key issues to be addressed related to chain performance measurement. First, performance imbalances along the chain should be identified. Second, with regard to measuring performance of chains active in the agri-business sector in general and in the traditional foodsector in particular, literature points a number of problems (*Aramyan,* 2007). Many agri-food firms, including traditional food firms do not screen their performance in a regular way (*Collins* et al., 2001). Besides, chains belonging to different sectors may have different characteristics (e.g. chain length, the closeness of chain 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] 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 performance imbalances along the chain. This paper is structured as follows: In the following part the materials and methods used are presented. Next, the research results are discussed and finally discussion points are made as well as further research topics formulated.

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;

2 Material and Methods

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 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 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. 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 character of the five main areas, all include several performance indicators (several statements) (*Gellynck* et al., 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 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

Analysis

First, significant differences between the suppliers', focal companies' and customers' perceptions about performance have been investigated. Comparisons of the different chain members with respect to performance are obtained through Kruskal-Wallis test followed by post-hoc Mann-Whitney U tests whenever the Kruskal-Wallis test yields a statistically significant result.

3 Results

The first question to be answered before proceeding any further in chain level analysis of the data is whether the different chain members (suppliers, focal companies, customers) score significantly different on each of the performance statements. This question can be answered by comparing the mean scores for the different chain members. The mean scores for the focal companies are separately computed according to their perception of their individual suppliers and customers. If significant differences are found between the different chain members, then the chains are performing in an imbalanced way. In the context of our paper, six types of chain imbalances are distinguished:

- Dyadic upper: focal company's perception score related to the supplier (FC_S) differs from supplier's perception score related to the focal company (S);
- Dyadic lower: focal company's perception score related to the customer (FC_C) differs from customer's perception score related to the focal company (C);
- Upstream: focal company's perception score related to the customer (FC_C) differs from the supplier's perception score related to the focal company (S);
- Downstream: focal company's perception score related to the supplier (FC_S) differs from the customer's perception score related to the focal company (C);
- Internal: focal company's perception score related to the supplier (FC_S) differs from focal company's perception score related to the customer (FC_C);
- External: supplier's perception score related to the focal company (S) differs from customer's perception score related to the focal company (C);

There is no significant difference in the total performance of the different chain members, although significant differences are found on the following performance statements: logistic cost (p=0.02), lead time (p=0,023), safety (p=0,000), attractiveness (p=0,00) and chain understanding (p=0,043) by conducting Kruskal-Wallis test (Table 2). In addition, a post-hoc Mann-Whitney U test identifies differences between chain members and consequently highlights the type of imbalance in the chain.

Focal companies contribute significantly less to lower logistic costs of both their suppliers (mean=4,28) and customers (mean=4,31) than the other way around (mean respectively 5,13 and 4,97). This illustrates the presence of

both upper (p=0.02) and lower (p=0.015) dyadic imbalance in the chain. The former could be explained by the fact that suppliers often bring the raw materials to the site of the focal company or is often located in the neighbourhood (e.g. dairy farmers being closely located to the traditional cheese processing plant). The latter is linked to the fact that traditional food producers often have poor distribution systems resulting in situations where customers pick up themselves the products rather than the other way around.

Further, both down- and upstream imbalances are noticed related to logistic costs. The former refers to customers evaluating focal companies' contribution to lowering their logistic costs (mean=4,31) as less important (p=0.02) than focal companies do in relation to their suppliers (mean=5,13). The latter relates to customers being perceived by focal companies to contribute less (p=0,027) to lower their logistics costs (mean=4,97) than suppliers do in relation to the focal companies (mean=4,28). Both down- and upstream imbalance confirm the previous reasoning where on the one hand traditional food producers are characterised by having a poor distribution system and relying often on customers for logistics. On the other hand, suppliers provide additional service by being responsible for transport of raw materials or are located in the neighbourhood, which might explain their higher score obtained from focal companies.

Suppliers perform significantly better in reducing lead time of their focal companies (mean=5,67) than focal companies perform in reducing lead time of their customers (mean=5,02; p=0,03). This again refers to downstream imbalance and illustrates the focal company being the weakest link in the chain when it comes to reducing lead time.

Further, upper dyadic imbalance exists related to safety where focal companies judge their suppliers as being more important (p=0,00) than vice versa. It again illustrates the less dominant role of the traditional food producer, now in relation to food safety and is further shown by the presence of downstream imbalance. Here, customers judge the role of focal companies of minor importance as compared to the role of suppliers for focal companies (p=0,00). In addition, safety is characterised by internal imbalance where the role of the supplier is estimated by the focal company to be much more important than the customer's one (p=0,00).

In terms of attractiveness, both down- and upstream imbalance are noticed. While focal companies are considered by their customers to be highly important in providing attractive products (mean=5,62), suppliers are estimated by focal companies to be less important (mean=4,67; p=0,00), which clearly illustrates downstream imbalance. It highlights the focal company being perceived as having the major role in providing attractive products. Further, upstream imbalance indicates that focal companies consider customers as being important factors in encouraging them to produce more attractive products (mean=5,34), while suppliers attach significantly less importance to focal companies in encouraging them to deliver more attractive products (mean=4,48; p=0,01). In line with these findings, internal imbalance indicates that focal companies consider the input from customers to the production of attractive products to be more important (mean=5,34) than the one from suppliers (mean=4,67; p=0,000).

Related to chain understanding, traditional food chains are characterised by lower dyadic imbalance. Focal companies estimate that customers contribute more to their understanding of other chain members' interest (mean=5,47) than vice versa (mean=4,86) (p=0,005). This dyadic imbalance can be explained by the customers being

Table 2: Performance scores for the different chain members, mean scores and standard deviations (SD).

Performance	FC_S n=85 Mean (SD)	FC_C n=83 Mean (SD)	S n=76 Mean (SD)	C n=79 Mean (SD)	Sample n=323 Mean (SD)
Traditionalism					
Authenticity	5,75 (1,69)	5,24 (1,69)	5,44 (1,64)	5,62 (1,52)	5,51 (1,64)
Gastronomic heritage	5,29 (1,78)	5,20 (1,63)	5,53 (1,66)	5,54 (1,51)	5,39 (1,65)
Efficiency					
Logistic cost	5,13 (1,56)b	4,97 (1,52)b	4,28 (1,90)a	4,31 (1,85)a	4,67 (1,75)
Profit	5,29 (1,25)	5,17 (1,32)	5,00 (1,41)	4,98 (1,55)	5,11 (1,39)
Responsiveness					
Lead time	5,67 (1,50)b	5,48 (1,27)a,b	5,31 (1,59)a,b	5,02 (1,62)a	5,37 (1,52)
Customer complaints	5,74 (1,20)	5,50 (1,21)	5,31 (1,59)	5,40 (1,46)	5,49 (1,38)
Quality					
Safety	6,16 (1,20)b	5,14 (1,37)a	5,08 (1,78)a	5,37 (1,53)a	5,44 (1,54)
Attractiveness	4,67 (1,79)a	5,34 (1,52)b	4,48 (1,81)a	5,62 (1,27)b	5,04 (1,66)
Environmental friendliness	5,18 (1,81)	4,74 (1,60)	4,66 (1,81)	4,65 (1,57)	4,81 (1,71)
Chain balance					
Distribution of risks and benefits	5,29 (1,48)	5,17 (1,45)	5,06 (1,53)	4,86 (1,58)	5,09 (1,51)
Chain understanding	5,20 (1,23)a,b	5,47 (1,35)b	5,30 (1,20)a,b	4,86 (1,55)a	5,21 (1,35)
Total	5,39 (0,84)	5,23 (0,82)	5,06 (1,01)	5,14 (1,00)	5,20 (0,93)

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; different letters (a-b-c) indicate significantly different average scores using Mann-Whitney U test, FC_S = Focal companies' perception about their suppliers, FC_C = Focal companies' perception about their customers, S= Suppliers' perception about their focal companies, C=Customers' perception about their focal companies

perceived as having more bargaining power and easier access to market information than the other chain members.

4 Discussions

In the frame of our paper, we measured traditional food chain performance and identified performance imbalances along the chain. It is realised 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.

Chain imbalances lead to lower performance. Chains are performing in an imbalanced way when differences exist between chain members' performance. Hereby, six different types of chain imbalances are distinguished: dyadic upper and lower, up- and downstream, internal and external. Most chain imbalances are noticed in relation to lowering logistic costs and to reducing lead time. Also in relation to the performance area quality important imbalances are noticed for safety and attractiveness. These findings allow chain members and policy makers to make specific and tailor made efforts for the traditional food sector to enhance specific performance areas at specific location of the chains.

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.

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;
S=Supplier, FC=Focal company, C=Customer

Acknowledgement

The paper is prepared in the frame of the TRUEFOOD – "Traditional United Europe Food" – project. TRUEFOOD is an Integrated Project financed by the European Commission under the 6th Framework Programme for RTD (Contract n. FOOD-CT-2006-016264). The information in this document reflects only the author's views and the Community is not liable for any use that may be made of the information contained therein. The authors are grateful for all the partners of WP5 for their contribution.

Appendix 2: Traditional food chain performance

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

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

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

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

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.

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