



## **TRUEFOOD**

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# National report on questionnaire surveys on determinants of bottlenecks and success factors

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## General introduction

The European food sector produces numerous traditional food products (TFP). Studies on food types such as 'healthy' food, 'functional' food, GMO-food and organic food already exists (e.g. Bech-Larsen and Grunert, 2003; Giraud, 2004; Magnusson and Koivisto Hursti, 2002). However, few published studies are related to TFP and even less to innovations in those food production systems.

TRUEFOOD aims to improve quality and safety of traditional food products, to support the marketing and supply chain development of traditional food products and to introduce innovation into traditional European food production systems, through research, demonstration, dissemination and training activities.

Work package 5 (WP5) is a part of the TRUEFOOD-project. The aim of WP5 is to develop strategies to improve marketing and supply chain organisation methods for traditional food products. Therefore WP5 is divided into four subtasks:

- Subtask 5.1** Determinants of bottlenecks and success factors of traditional food producers (i - iii)
- Subtask 5.2** Benchmark for evaluating marketing management capabilities of traditional food producers (iv - v)
- Subtask 5.3** Indicators of overall traditional food supply chain performance (vi)
- Subtask 5.4** Innovative distribution strategies for traditional food products' (vii)

Within work package 5 traditional products are defined as followed:

1. **Production:** the key steps of production must be local (national/regional/local). Once firms start to produce in other countries, the food is no longer considered as traditional.
2. **Authentic:** the product has to fulfil at least one of the following steps: authentic recipe (mix of ingredients) and/or authentic origin of raw material and/or authentic production process
3. **Commercially available** for the public for at least 50 years (= 1950 and before) in stores or restaurants; it may happen that during that period the food product disappeared from the market, but it was on market at least 50 years ago.
4. **Gastronomic heritage:** the product must have a story which is -or can be- written down in 2-3 pages

This report is part of subtask 5.1 and shows the results from the national surveys investigating the determinants of bottlenecks and success factors of traditional food producers in Belgium, Hungary and Italy.

The report is structured as follows. For each country a short introduction is presented, followed by the research hypotheses and the methodology. Then the results are presented and discussed per research hypotheses. Finally, conclusions are drawn.

# BELGIUM

## 1. Introduction

The European food sector produces numerous traditional food products (TFP). Studies on food types such as 'healthy food', 'functional food', GMO-food and organic food already exists (e.g. TYPIC, 2003 - 2005). However, few published studies are related to TFP and even less to innovations in those food production systems (e.g. Jordana, 2000).

Innovation can be defined as an ongoing process of learning, searching and exploring resulting in new products, new techniques, new forms of organization and new markets (Lundvall, 1995). Innovation is a continuous process characterized by three steps: efforts, activities and results. Efforts are all resources, such as human and financial resources, a firm is investing in activities for the development of innovations. Results are the effects of these innovation activities on tangible (e.g. growth of market share, profit) as well as less tangible aspects (e.g. firm stability, efficiency) (Gellynck et al., 2006). Consequently, the measurement of innovation capacity captures also the progress in developing an innovation and not only the result, such as the successful implementation of innovation (Gellynck et al., 2007).

Innovation involves changes in an organization (Damanpour, 1991). On the one hand, it is a response to changes of the firm's internal or external environment, and on the other hand, it is a preventive step to anticipate changes in the firm's environment. Organizational strength in a firm is encouraging the innovation process (Ussman et al., 1999) and increasing the firm's competitive advantage (Murphy, 2002). Furthermore, innovation in small and medium sized food firms (SMEs) is often achieved through the improvement of networking (Avermaete and Viaene, 2002). Therefore, SMEs need an environment that stimulates innovation and improves networking activities. The creation of such an environment can be supported by governmental institutions, for instance by improving the infrastructure for networking (Scozzi et al., 2005; Ussman et al., 1999). However, evidence shows that SMEs are mainly not aware of the importance of being innovative and often face difficulties to gain access to institutions, such as research centers, and government (Avermaete et al., 2003; Ussman et al., 1999).

Furthermore, in recent years many researchers found that the place of innovation is not the single firm alone, but the network the firm is imbedded in (e.g. Pittaway et al., 2004; Powell et al., 1996). A network can be described as the place where actors within one or between several related industrial sectors interact and collaborate to add value for the customer (Omta, 2004). Networks are formed because they offer opportunities for new relationships, links or markets and allow access to new or complementary competencies and technologies (Lazzarini et al., 2001; Pittaway et al., 2004). Therefore, in order to advance the innovation process, it is very important to integrate suppliers, customers and third parties (e.g. government, research centers etc.) into the network. They will support the innovation process and reduce the risk of innovation, e.g. by joint cost management (Omta, 2002; Pittaway et al., 2004). Since networks increase the flow of information, they play an important role for the diffusion and adoption of innovation (Pittaway et al., 2004).

The aim of this report is to contribute to the understanding and measurement of the determinants of bottlenecks and success factors related to innovation in the chains of traditional food products. In this report the Belgian results from the traditional cheese and beer sector are presented.

## **2. Research hypotheses**

In this report following hypotheses will be investigated. These hypotheses are a selection of a larger number of hypotheses related to the research in work package 5 of the Truefood project.

H1) Different cultural backgrounds and political systems lead to different levels of and innovation capacity of SME's.

H3) At traditional foods innovation in convenience, packaging, labeling, logistics, market is more acceptable than innovation in production/processing. However process innovation is acceptable if the key process and the key product attributes will not be changed.

H4) Organizational innovation leads to higher supply chain performance

H5) More intensive collaboration with other organizations in the supply chain (e.g. in terms of product, packaging, process improvement and development of related services and marketing) leads to higher innovation capacity.

H6) Higher level of integration in the supply chain leads to higher level of innovation capacity

H7) A certain threshold of trust is necessary for collective activities (research, marketing, shared use of resources)

H8) A higher level of trust leads to more intensive collective activities (research, marketing, shared use of resources)

H9) Collective activities (collective research, collective marketing, collective purchasing and collective use of resources) lead to better supply chain performance.

H12) External knowledge sources of traditional food companies are located at different geographical scales, whereby the geographical scale will depend of the type of knowledge.

## **3. Methodology**

### **3.1. Data collection method**

The research setup is to investigate specific chains. Hence, a chain is defined to be composed of at least 1 supplier + 1 food manufacturer + 1 customer. The food manufacturer is the focal company in our sample. Therefore, contacting and data collection started at the level of the food manufacturer.

The data collection took place in two main steps. First, the food manufacturer was contacted by phone or email in order to check his/her availability and willingness to participate based on earlier contact experiences within the Truefood project and otherwise randomly. The interviews were carried out mainly face-to-face. Only in a few cases the questionnaire was filled-in self-administered, with subsequent phone or email contact in case of unclear questions. During the interviews the food manufacturers had to choose their most important supplier and their most important customer, subsequent names and contact details were provided by the food manufacturer.

Second, the suppliers and customers of the interviewed food manufacturers were contacted by phone or email in order to check their availability and willingness to participate. In most of the

cases the suppliers and customers were willingly and available to participate in the survey. In the few cases of refusal we went back to the food manufacturer to ask for another supplier or customer and to fill in the second part of the questionnaire again in accordance to the new chosen supplier or customer.

The aim was to investigate 30 chains, hence, these steps were continued until data of 30 chain-triplets, composed of the food manufacturer (focal companies) and its supplier and customer, were collected.

### 3.2. Description of sample

In the Belgian sample food manufacturers and their suppliers and customers are investigated in the traditional cheese and beer sector. A summary statistic about number of employees, profitability and business growth is presented in Table 1.

**Table 1: Description of the Belgian sample in the traditional cheese and beer sector (N<sub>total</sub>=90; Figures represent frequencies)**

	Belgium				Cheese				Beer			
	FC	S	C	Total	FC	S	C	Total	FC	S	C	Total
<b>Nr. Empl.</b>												
≤ 10	19	11	13	<b>43</b>	11	7	4	<b>22</b>	8	4	9	<b>21</b>
11 to 50	7	11	10	<b>28</b>	2	4	5	<b>11</b>	5	7	5	<b>17</b>
50 to 250	4	3	2	<b>9</b>	2	2	2	<b>6</b>	2	1	0	<b>3</b>
> 250	0	5	5	<b>10</b>	0	2	4	<b>6</b>	0	3	1	<b>4</b>
<b>Profitability</b>	5,4	5,3	6,1	<b>5,6</b>	4,9	5,0	6,1	<b>5,3</b>	5,9	5,6	6,1	<b>5,9</b>
<b>Bus. growth</b>	5,4	4,6	6,7	<b>5,6</b>	5,1	4,4	6,6	<b>5,4</b>	5,8	4,9	6,7	<b>5,8</b>

FC = Focal company (food manufacturer), S = Supplier, C = Customer, Empl. = Employees, Bus. growth = Business growth; Source: own data

The main part of the Belgian sample is composed by micro firms (≤ 10 employees), followed by small sized firms (11-50 employees). Only few medium sized firms are included in the sample. As the focus is on SMEs for the focal companies no large food manufacturers (> 250 employees) were interviewed. However, this restriction was not valid for the suppliers and customers of the focal companies. Though, also the suppliers and customers were mainly micro or small sized firms.

The overall profitability and business growth of the Belgian traditional cheese and beer sector is on the positive side. Stating that on average the profitability and the growth of the business has increased during the last three years. The main differences between the investigated firms in the cheese and beer sector are the slightly lower profitability and business growth of the cheese related firms. However, it is remarkable that the customers of cheese and beer manufacturers have similar profitability and business growth.

### 3.3. Questions used in the survey

The questionnaire used in the survey is presented in the deliverable D5.1.6. In this section the aspects of the two main concepts, namely innovation and collaboration, are presented.

#### **Innovation:**

- *Human efforts*: amount of time that companies turn on different training activities (courses, self study, seminars, fieldwork, experimental trials)

- *Financial efforts*: the type of the budget of product development, process development, market research and organizational development.
- *Innovation activities*: different type of activities that was introduced in last 3 years
  - product innovation (packaging, quality, convenience)
  - market innovation (entering new markets, marketing activities),
  - organizational innovation (new management tools, improving of management of R&D, participation in networks).
- *Results of innovation* activities as significant contribution to the business success.

**Joint activities:**

- *Collaboration with partners*: using production equipments jointly with partners, sharing knowledge systematically, and joint planning of different activities.
- *Collaboration in R & D*: selection of partners for joint R&D.

### 3.4. Data analysis

In this section the way of data analysis is described. First the coding and necessary recoding is presented. Following, the way of how the innovation capacity score and the collaboration score were calculated is described.

#### 3.4.1. (Re)Coding of the questions

For the innovation capacity four questions were asked in the questionnaire related to the innovation process composed of the three steps: efforts (human and financial), activities and results. These questions are coded in different scales according to the topic and type of question (Table 2). For the question about innovation activities the answer possibilities for “No” and “N.A.” needed to be recoded in order to calculate a proper score.

**Table 2: Coding and recoding of the questions related to innovation capacity (Q4-7)**

Variable	Scale	Coding
<b>Human efforts</b>	None	1
	Once a year	2
	Once in 6 months	3
	Once in 3 months	4
	At least once a month	5
	Once a week	6
	Several times a week	7
<b>Financial efforts</b>	None	1
	Spent according to the necessity without being budgeted	2
	Distinctively budgeted on project base	3
	Distinctively budgeted on yearly base	4
<b>Innovation activities</b>	Yes	1
	No	2 ⇒ 0
	N.A.	3 ⇒ 0
<b>Innovation result / contribution to success</b>	Strongly disagree	1
	Moderately disagree	2
	Slightly disagree	3
	Neither agree, nor disagree	4
	Slightly agree	5
	Moderately agree	6
	Strongly agree	7

For collaboration (joint activities) the “No” answers needed to be recoded in order to conduct proper analysis (Table 3).

**Table 3: Coding and recoding of the questions related to collaboration (joint activities) (Q11-12)**

Variable	Scale	Coding
Joint activities with supplier and/or customer	yes	1
	no	2 ⇨ 0
Joint R&D activities with supplier and/or customer, peers, 3rd parties	Yes	1
	No	2 ⇨ 0

### 3.4.2. Calculation of scores & analysis

1. The innovation capacity score was introduced in the following way. The median of the scores of human efforts, the financial efforts and the results of innovation (Q4, Q5, and Q7), and the sum of innovation activities (Q6) was standardized. Then, the average of the standardized scores of these four variables was determined.

$$(1) \quad 0 \leq \frac{x - \text{minimum}}{\text{maximum} - \text{minimum}} \leq 1$$

This score describes the innovation capacity of a chain. If its value is 1 it has maximal innovation capacity, if it is 0 it has minimal innovation capacity.

2. Collaboration:

Collaboration scores were standardized similar to the previously mentioned method (Q11 and Q12). The standardized collaboration score describes the level of the collaboration of a chain. If this value is 1 the collaboration is very well, if it is 0 the partners in the chain do not collaborate at all. Finally, the scores describing the collaboration were summarized for each participant and for each chain.

3. Chain performance:

For chain performance the relationships between the FC and its supplier and customer, respectively, were investigated (Q9). Hence, for each relationship (FC-S, FC-C, S-FC, C-FC) the mean score was calculated over the performance indicators, namely traditionalism, efficiency, responsiveness, quality, and chain balance. Finally, for the overall chain performance the mean over all four relationship types was calculated for each chain.

4. Integration level within the chain:

The integration of chain partners with each other can be characterized by the following nomenclature (Q16): 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. For the score on chain integration level the mean over all four types of relationships (FC-S, FC-C, S-FC, C-FC) was calculated for each chain.

5. Trust in the chain:

For each relationship type (FC-S, FC-C, S-FC, C-FC) the mean score on the trust variables (Q10) was calculated for each chain.

The relationships between variables were analyzed with frequency and correlation analysis.

## 4. Results

In order to explore differences between stakeholders in the first two parts of this section the summary statistics related to innovation capacity and collaboration are presented. Following, in part three of this section, results to the before mentioned research hypotheses are discussed.

### 4.1. Summary statistics of innovation capacity in Belgium

Innovation capacity was measured according to the steps of the innovation process, namely according to efforts, activities and results. The results presented are showing the differences between the stakeholders of the chains, being the focal company (traditional food manufacturer), the supplier and the customer (Table 4).

The overall innovation capacity of the chains (based on standardized scores) in the Belgian traditional food sector is on an average level, shown by a median of 0,49 on a scale from 0 to 1, with 1 indicating maximum innovation capacity (Table 4).

**Table 4: Summary statistics of innovation capacity in Belgium**

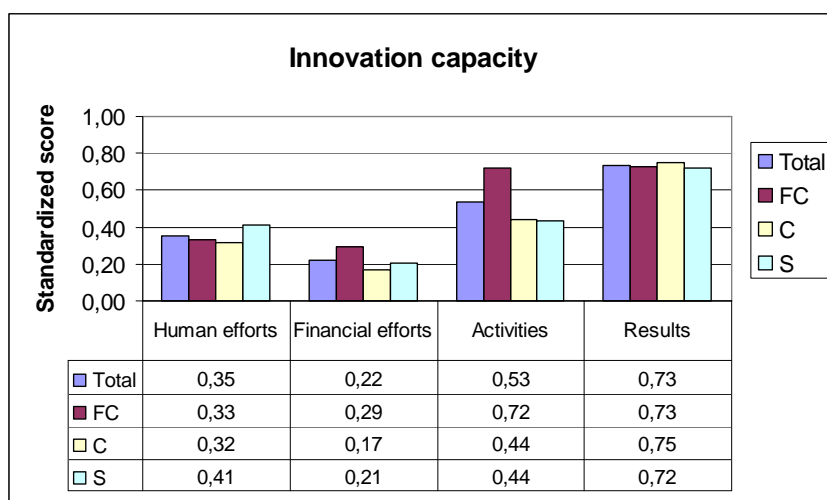
Innovation capacity	N		Mean	Median	Std. Deviation	Minimum	Maximum
	Valid	Missing					
FC_efforts_human	30	0	3,22	3,00	1,172	1	5,40
C_efforts_human	30	0	3,05	2,90	1,045	1	4,83
S_efforts_human	30	0	3,55	3,45	1,146	1	6,00
FC_efforts_financial	30	0	2,11	1,88	0,751	1	4,00
C_efforts_financial	30	0	1,56	1,50	0,564	1	3,50
S_efforts_financial	30	0	1,72	1,63	0,601	1	4,00
FC_activities	30	0	6,57	6,50	1,924	3	10,00
C_activities	30	0	3,67	4,00	2,106	0	7,00
S_activities	30	0	3,33	3,50	1,605	0	7,00
FC_results	30	0	5,38	5,35	0,763	4	7,00
C_results	28	2	5,43	5,50	0,735	4	7,00
S_results	29	1	5,57	5,33	0,811	4	7,00
Total (stand.score)	27	3	0,48	0,49	0,076	0,35	0,66

Index: FC=Focal company, C=Customer, S=Supplier

Source: own data

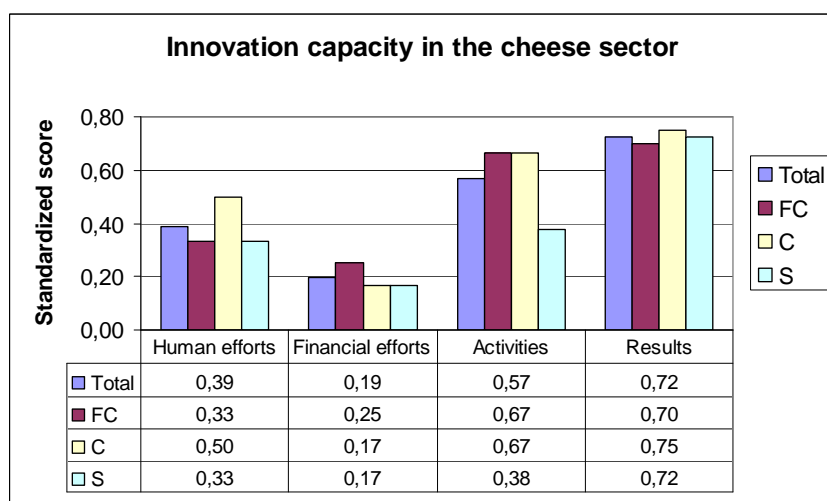
An overview of the innovation capacity in Belgium is provided in Figure 1. In this figure standardized scores are used calculated according to the above mentioned formula and based on the median.

It is remarkable that the focal companies are investing more financial efforts and are applying the most types of innovation in comparison to the suppliers and customers. In contrast, suppliers are investing more in human efforts. Customers are performing lowest in all parts of the innovation process, except for the result step. However, the outcome of “results”, measured as significant contribution of the applied innovation to the business success, is about equally for all stakeholders. The few innovations applied by suppliers and customers are similarly contributing to the business success than the applied innovations by the focal companies.



**Figure 1: Innovation capacity in Belgium with standardized scores, with 1 indicating maximal innovation capacity; FC=Focal company, C=Customer, S=Supplier; N=90; Source: own data**

The comparison of the Belgian cheese and beer sector (Figure 2 and Figure 3) shows that in the cheese sector the customers are considerably investing more efforts in more activities, which have higher significant contributions to the business success. Furthermore, the focal companies in the cheese sector are less performing in all three steps of the innovation process than the focal companies in the beer sector. The same is valid for the suppliers in the cheese sector.



**Figure 2: Innovation capacity in the Belgian cheese sector with standardized scores, with 1 indicating maximal innovation capacity; FC=Focal company, C=Customer, S=Supplier; N=45; Source: own data**

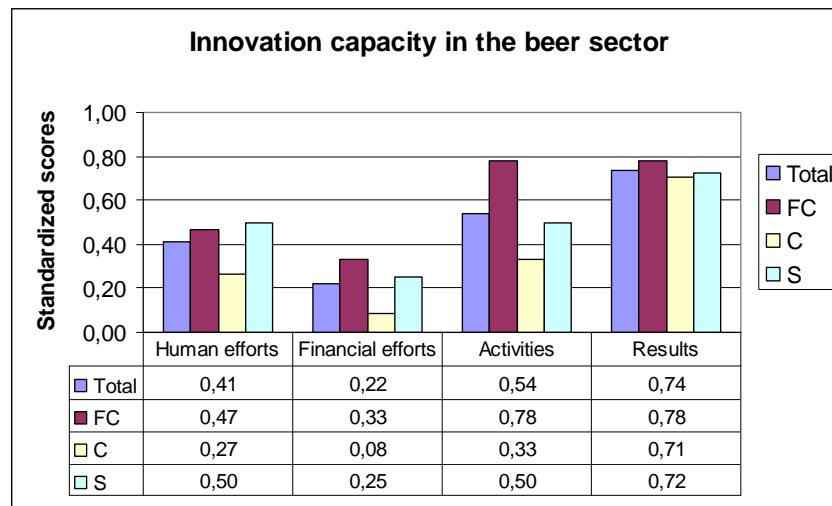


Figure 3: Innovation capacity in the Belgian beer sector with standardized scores, with 1 indicating maximal innovation capacity; FC=Focal company, C=Customer, S=Supplier; N=45; Source: own data

## 4.2. Summary statistics of collaboration in Belgium

Collaboration was measured in terms of different areas of joint activities, namely joint use of equipments, systematically sharing of knowledge, joint planning, and joint R&D. The respondents had to answer to these variables in accordance to their supplier and/or customer. The results are presented showing the differences between the stakeholders of the chains, being the focal company (traditional food manufacturer), the supplier and the customer (Table 5).

The overall collaboration activity of the chains (based on standardized scores) in the Belgian traditional food sector is on an average level, shown by a median of 0,50 on a scale from 0 to 1, with 1 indicating maximum collaboration (Table 5).

Table 5: Summary statistics of collaboration (joint activities) in the Belgium (N<sub>total</sub>=90)

Joint activities	N		Mean	Median	Std. Dev.,	Minimum	Maximum
	Valid	Missing					
FC_Use of equipments with supplier	30	0	0,17	0,00	0,38	0	1
FC_Sharing knowledge with supplier	30	0	0,73	1,00	0,45	0	1
FC_Joint planning of activities with supplier	30	0	0,57	1,00	0,50	0	1
FC_Use of equipments with customer	30	0	0,13	0,00	0,35	0	1
FC_Sharing knowledge with customer	30	0	0,73	1,00	0,45	0	1
FC_Joint planning of activities with customer	30	0	0,60	1,00	0,50	0	1
FC_Joint R&D with supplier	30	0	0,40	0,00	0,50	0	1
FC_Joint R&D with customer	30	0	0,23	0,00	0,43	0	1
FC_Joint R&D with peers	30	0	0,63	1,00	0,49	0	1
FC_Joint R&D with 3rd parties	30	0	0,73	1,00	0,45	0	1
S_Use of equipments with client	30	0	0,10	0,00	0,31	0	1
S_Sharing knowledge with client	30	0	0,73	1,00	0,45	0	1
S_Joint planning of activities with client	30	0	0,53	1,00	0,51	0	1
S_Joint R&D with client	30	0	0,27	0,00	0,45	0	1
S_Joint R&D with peers	29	1	0,62	1,00	0,49	0	1
S_Joint R&D with 3rd parties	29	1	0,72	1,00	0,45	0	1
C_Use of equipments with supplier	30	0	0,03	0,00	0,18	0	1
C_Sharing knowledge with supplier	30	0	0,60	1,00	0,50	0	1
C_Joint planning of activities with supplier	30	0	0,70	1,00	0,47	0	1
C_Joint R&D with supplier	30	0	0,30	0,00	0,47	0	1

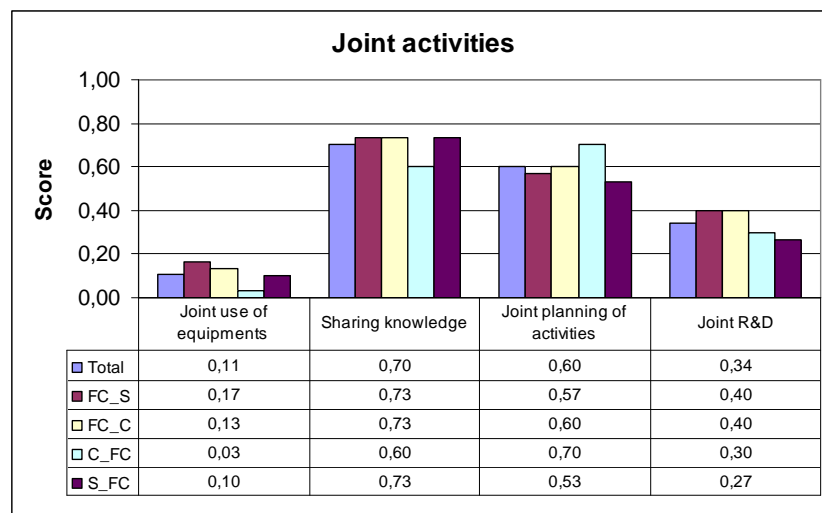
C_Joint R&D with peers	30	0	0,47	0,00	0,51	0	1
C_Joint R&D with 3rd parties	30	0	0,27	0,00	0,45	0	1
Total (standardized score)	29	1	0,50	0,54	0,16	0,18	0,86

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

Source: own data

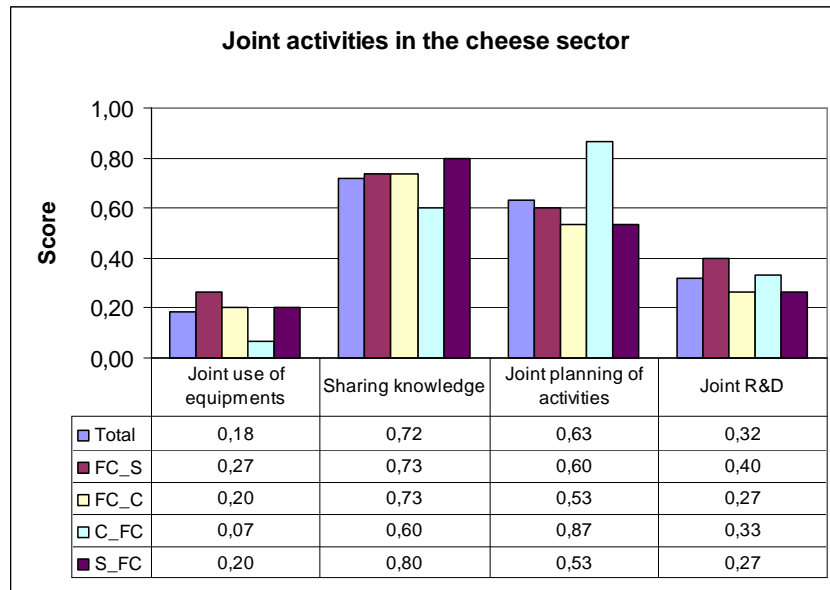
Out of the four areas of collaboration the joint use of equipments was the least performed joint activity in Belgium. The main practiced joint activity is systematically sharing knowledge among each other, followed by joint planning of activities. Joint R&D is still performed by more than one third of the sample.

It is worth to mention that there is a disagreement between the statements of the focal companies towards their suppliers/customers and what the customers and suppliers stated in relation to the focal company. That disagreement might be due to a different perception of the joint activities by the three different chain stakeholders.

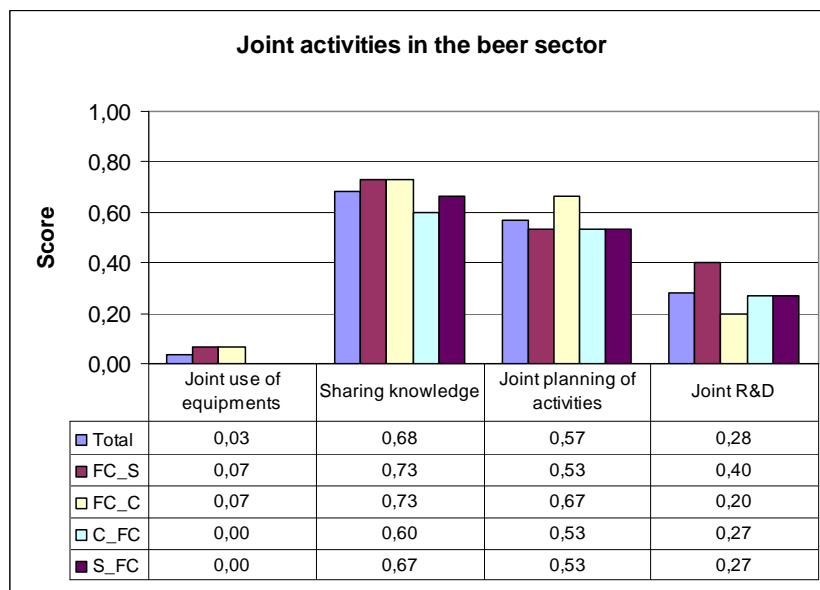


**Figure 4: Joint activities in Belgium between the FC and its S and C, and between the C and S with its FC; Score: from 0 to 1, with 1 indicating maximum joint activities; FC=Focal company, C=Customer, S=Supplier; N=90; Source: own data**

The comparison between the Belgian cheese and beer sector (Figure 5 and Figure 6) shows a similar picture for both sectors. The difference lies in the remarkable high joint planning activities of customers with their focal company in the cheese sector, whereas in the beer sector it are the focal companies which state the highest joint planning activity with their customers. Moreover, in the beer sector the joint use of equipments is noteworthy lower than in the cheese sector.



**Figure 5: Joint activities in the Belgian cheese sector between the FC and its S and C, and between the C and S with its FC; Score: from 0 to 1, with 1 indicating maximum joint activities; FC=Focal company, C=Customer, S=Supplier; N=45; Source: own data**



**Figure 6: Joint activities in the Belgian beer sector between the FC and its S and C, and between the C and S with its FC; Score: from 0 to 1, with 1 indicating maximum joint activities; FC=Focal company, C=Customer, S=Supplier; N=45; Source: own data**

The joint activities for R&D were also investigated towards peers and third parties. Peers are firms having similar activities in the same sector. Third parties are R&D institutions, universities, technology partners, information technology providers, consultants and others. Overall, Focal companies and suppliers are participating more in joint R&D activities with peers and third parties than customers do (Figure 7). Furthermore, joint R&D is more practiced with third parties than with peers, except for the customers, where it is the contrary.

The comparison between sectors shows that joint R&D is done more in the beer sector than in the cheese sector (Figure 7). In the cheese sector joint R&D activities are mainly performed with third parties. Moreover, the customer and supplier in the cheese sector are much less active in joint R&D than the focal companies are. Contrary, in the beer sector the suppliers are most active in joint R&D

activities. Also contrary to the cheese sector the customers in the beer sector collaborate remarkably more with their peers than with third parties.

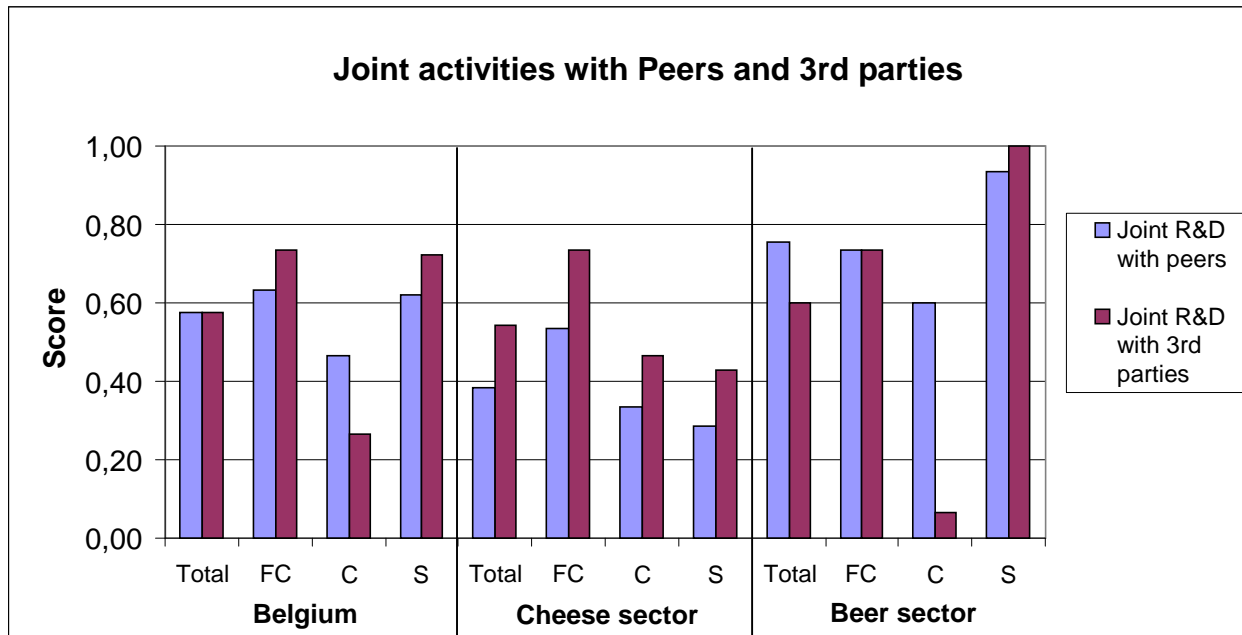


Figure 7: Joint activities in Belgium and the Belgian cheese and beer sector of FC, S, and C with their peers and 3<sup>rd</sup> parties; Score: from 0 to 1, with 1 indicating maximum joint activities; FC=Focal company, C=Customer, S=Supplier; N=90 and 45, respectively; Source: own data

### 4.3. Discussion of research hypotheses

**H1) Different cultural backgrounds and political systems lead to different levels of and innovation capacity of SME's.**

This hypothesis cannot be answered in the frame of this report. The effects of different cultural political systems will be explored between the different countries Belgium, Hungary and Italy in the summary report.

**H3) At traditional foods innovation in convenience, packaging, labeling, logistics, market is more acceptable than innovation in production/processing.**

For this hypothesis the frequencies of the innovation activities related to product (packaging, quality, convenience), market (new geographical markets, marketing activities) and organizational innovation (new management tools, management practices for R&D, networking) are compared (Table 6).

All variables were measured at the level of FC, C, and S, except packaging innovation activity, which was not asked to the suppliers. The reason is, that suppliers are not expected to be active in packaging innovation in the way food manufacturers and customers are. Therefore, also the frequencies for innovation activities are also presented in percent with respect to that difference for packaging innovation.

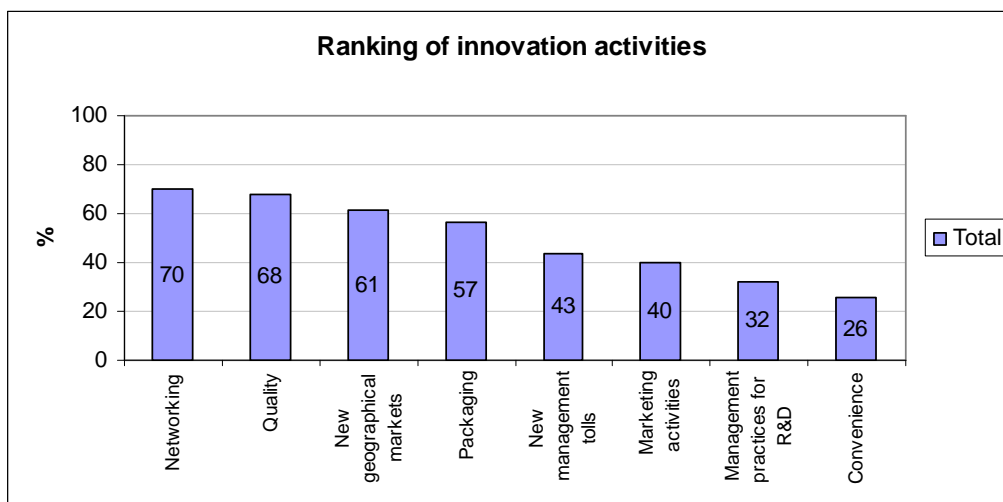
Table 6: Innovation activities of FC, S, and C in Belgium in the fields of product, market, and organizational innovation (N<sub>total</sub>=90; Figures represent frequencies)

Innovation activity	Total	FC	C	S	%
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Packaging*	34	21	13	0	57
Quality	61	25	12	24	68
Convenience	23	13	7	3	26
New geographical markets	55	19	18	18	61
Marketing activities	36	16	16	4	40
New management tools	39	11	13	15	43
Management practices for R&D	29	11	12	6	32
Networking	63	21	19	23	70

\* Packaging innovation was only asked for the focal company and the customer  
FC=Focal company, C=Customer, S=Supplier; Source: own data

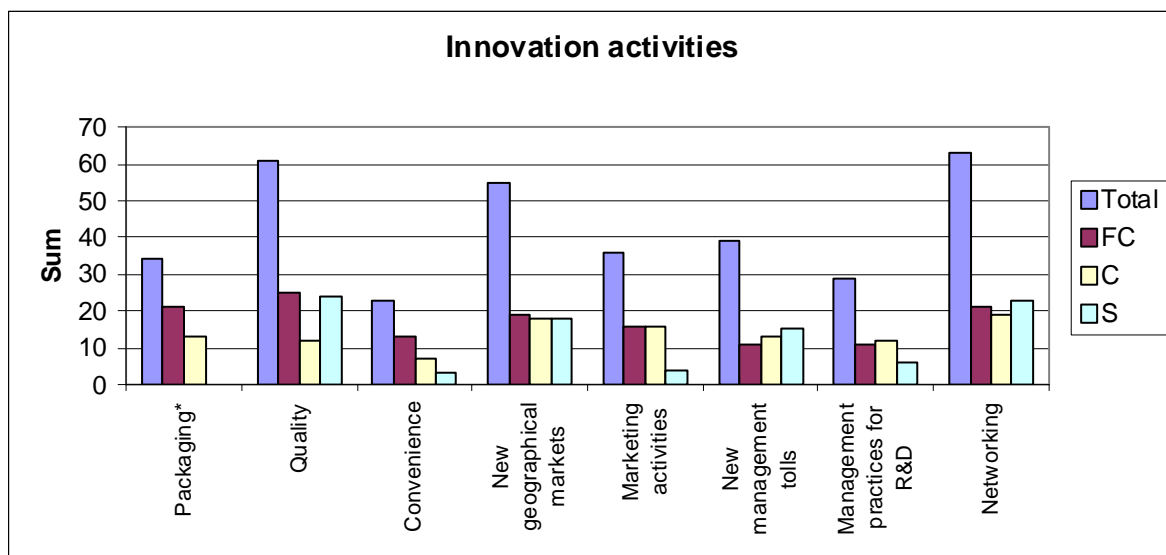
The main innovation activities applied in Belgium are improved networking, improving the quality of the product, entering new geographical markets with the traditional food product and packaging innovation (Figure 8).



**Figure 8: Ranking of innovation activities in Belgium in the fields of product, market and organizational innovation (Source: own data)**

However, there are differences between the three chain members in relation to their innovation activities. For instance, the suppliers are very active in improving their product quality and their networking, whereas the customers are noticeably little active in product quality improvement (Figure 9).

Summarized, at Belgian traditional food products all types of innovation, organizational (networking), product (quality), and market (new geographical markets), are similar important. Hence hypothesis 3 cannot be confirmed.



**Figure 9: Innovation activities in Belgium in the fields of product, market and organizational innovation (FC=Focal company, C=Customer, S=Supplier; N=90; Source: own data)**

\* Packaging innovation was only asked for the focal company and the customer

#### H4) Organizational innovation leads to higher supply chain performance

The standardized scores of chain organizational innovation are correlated with the scores for chain performance. The variables for organizational innovation are described under H3. Variables included in the score for chain performance are: Traditionality, efficiency, responsiveness, quality, and chain balance.

The correlation analysis did not reveal any statistical significant correlations between organizational innovation and chain performance. However, the correlation is strongest in the cheese sector, but still not significant (Table 7).

Hence, hypothesis 4 cannot be confirmed for the Belgian case studies.

**Table 7: Correlation coefficients between organizational innovation and chain performance of the total sample (N=30 chains), of the cheese sector (N=15 chains), and the beer sector (N=15 chains)**

	Organizational innovation		
	Belgium	Cheese	Beer
<b>Chain performance</b>	0.277	0.481	0.144
<b>Sign.<sup>1</sup></b>	0.225	0.190	0.656

<sup>1</sup> Spearman's rho test; Source: own data

#### H5) More intensive collaboration with other organizations in the supply chain leads to higher innovation capacity.

The correlation of standardized scores of innovation capacity and collaboration didn't reveal any statistical significant relationships (Table 8). Hence hypothesis 5 cannot be confirmed.

**Table 8: Correlation coefficients between innovation capacity and collaboration of the total sample (N=29 chains), of the cheese sector (N=14 chains), and the beer sector (N=15 chains)**

	Innovation capacity		
	Belgium	Cheese	Beer
<b>Collaboration</b>	0.258	0.254	0.183

<b>Sign.</b> <sup>1</sup>	0.203	0.426	0.531
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<sup>1</sup> Spearman's rho test; Source: own data

### H6) Higher level of integration in the supply chain leads to higher level of innovation capacity

The correlation of chain integration and the standardized scores of innovation capacity did not result in any statistical significant relationship in the Belgian sample. Furthermore, the correlations are not very strong.

Hence, hypothesis 6 cannot be confirmed.

**Table 9: Correlation coefficients between innovation capacity and chain integration of the total sample (N=27 chains), of the cheese sector (N=13 chains), and the beer sector (N=14 chains)**

	Innovation capacity		
	Belgium	Cheese	Beer
<b>Chain integration</b>	-0.037	0.148	-0.101
<b>Sign.</b> <sup>1</sup>	0.853	0.630	0.732

<sup>1</sup> Spearman's rho test; Source: own data

### H7+8) A certain threshold of trust is necessary for collaboration & A higher level of trust leads to more intensive collaboration

The trust in the chains of traditional food products is relatively high, indicated by the high mean and median, and a minimum level of trust at 4,63 on a 7-point Likert scale (Table 10).

The correlation of standardized scores of collaboration and chain trust didn't reveal any statistical significant relationships. Though, is it noticeably that for the beer sector the correlation is relatively strong and positive, and furthermore very close to a significant level of 90% (Table 11). This means the higher the chain trust the higher the collaboration and vice versa.

Hence, hypothesis 7, that a certain threshold of trust is necessary for collaboration can be confirmed under reserve, based on the relatively high trust levels in the traditional food chains. The high correlation of chain trust and collaboration in the beer sector is an indication that hypothesis 8 is probably confirmable, but the results should be repeated with a larger data set.

**Table 10: Summary statistics for SC\_Trust (N=30 chains)**

	N		Mean	Median	Std. Deviation	Minimum	Maximum
	Valid	Missing					
<b>SC_Trust</b>	30	0	5,77	5,72	0,59	4,63	6,69

**Table 11: Correlation coefficients between collaboration and chain trust of the total sample (N=27 chains), of the cheese sector (N=14 chains), and the beer sector (N=15 chains)**

	Collaboration		
	Belgium	Cheese	Beer
<b>Chain trust</b>	0.122	-0.080	0.434
<b>Sign.</b> <sup>1</sup>	0.530	0.785	0.106

<sup>1</sup> Spearman's rho test; Source: own data

### H9) Collaboration leads to better SCP.

The correlation of the standardized scores of collaboration and chain performance resulted in statistical significant positive relationships between chain performance and collaboration for the overall sample and the cheese sector. That means, the more the chain partners collaborate with each other, the better is their chain performance and vice versa. For the beer sector this correlation is not statistical significant.

Hence, hypothesis 9 cannot be rejected.

**Table 12: Correlation coefficients between joint activities and chain performance of the total sample (N=21 chains), of the cheese sector (N=9 chains), and the beer sector (N=12 chains)**

	Collaboration		
	Belgium	Cheese	Beer
<b>Chain performance</b>	0.402	0.588	0.226
<b>Sign.<sup>1</sup></b>	0.071*	0.096*	0.480

<sup>1</sup> Spearman's rho test, \* Significant on a <0.1 level; Source: own data

## **H12) External knowledge sources of traditional food companies are located at different geographical scales, whereby the geographical scale will depend of the type of knowledge.**

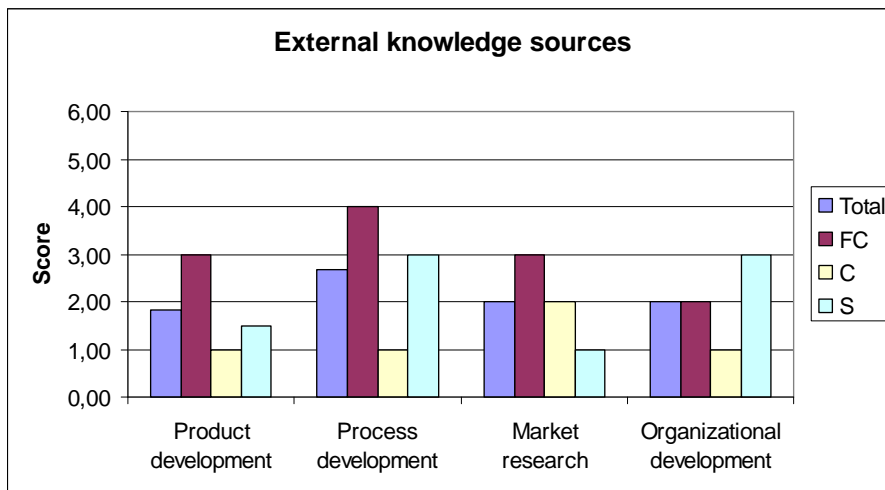
External knowledge sources were measured for product, process, market and organizational development on a scale with increasing geographical distance, reaching from no need for external support (1) to outside Europe (6). On average, the external knowledge sources are located on regional level (Table 13).

**Table 13: Summary statistics of external knowledge sources in Belgium (N<sub>total</sub>=90)**

External knowledge sources	N		Mean	Median	Std. Deviation	Minimum	Maximum
	Valid	Missing					
FC_Product development	29	1	3,10	3,00	1,26	1	5
FC_Process development	30	0	3,33	4,00	1,45	1	6
FC_Market research	30	0	2,70	3,00	1,56	1	6
FC_Organizational development	30	0	2,20	2,00	1,24	1	5
S_Product development	30	0	2,10	1,50	1,47	1	5
S_Process development	30	0	3,00	3,00	2,00	1	6
S_Market research	30	0	2,87	1,00	2,11	1	6
S_Organizational development	30	0	3,00	3,00	1,82	1	6
C_Product development	29	1	1,86	1,00	1,46	1	5
C_Process development	29	1	1,66	1,00	1,26	1	5
C_Market research	30	0	2,50	2,00	1,59	1	5
C_Organizational development	30	0	2,27	1,00	1,48	1	5

FC=Focal company, C=Customer, S=Supplier; Source: own data

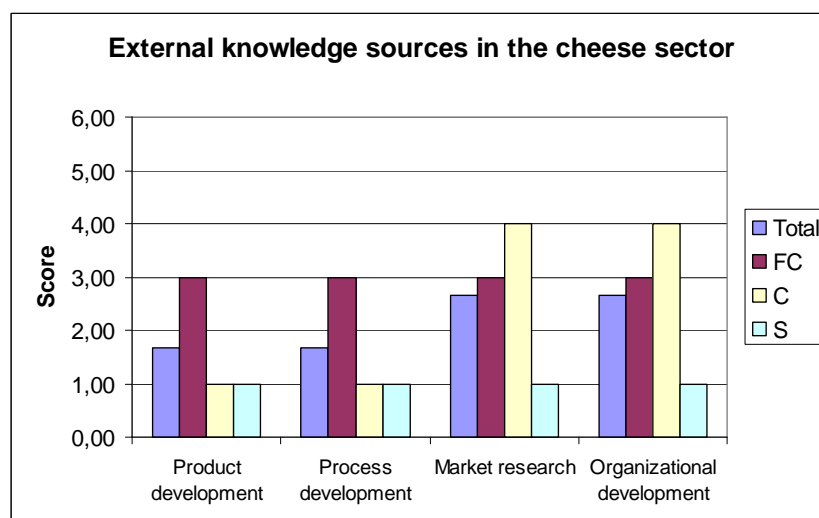
Differentiated for the four types of innovation it is remarkable that the food manufacturers are seeking and receiving external knowledge support on a farer geographical distance than the suppliers and customers. An exception is the suppliers seek for organizational innovation on regional level, whereas the food manufacturer is seeking it only on local level. In contrast, the customers are seeking support only for market research on local level.



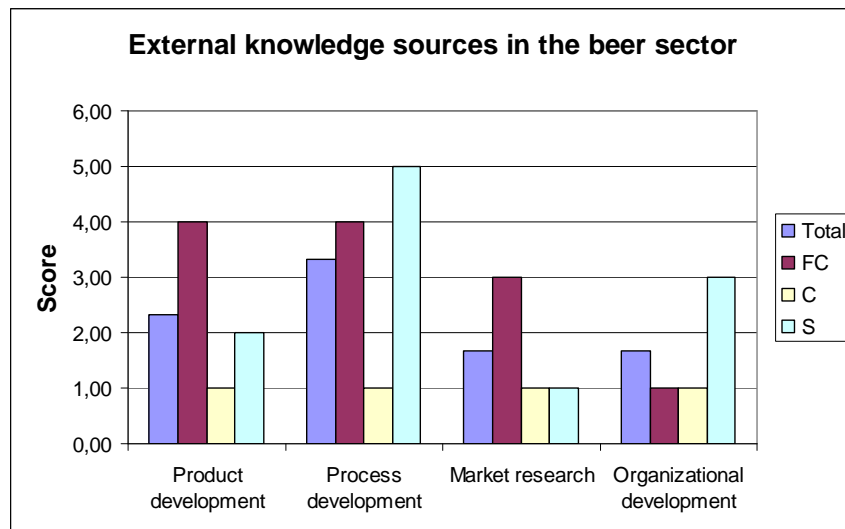
**Figure 10: External knowledge sources for product, process, market and organizational development in Belgium; Scores: 1=no need for external support, 2=Local, 3=Regional, 4=National, 5=Europe, 6=Outside Europe; FC=Focal company, C=Customer, S=Supplier; N=90; Source: own data**

Comparing the cheese and the beer sector, differences between the sectors become very clear (Figure 11 and Figure 12). The cheese manufacturers are searching external knowledge for all types of innovation on a regional level. In contrast, the beer manufacturers search external knowledge for product and process development sources on national level, and for market research on regional level. Moreover, the beer manufacturers are indicating that they do not need any external support for organizational development. Similarly to the beer customers, the customers in the cheese sector do not need external support for product or process development. In contrast, the cheese customers are receiving external knowledge support for market research and organizational development from national level. Also the suppliers search for external knowledge sources is differing between the sectors. In the cheese sector the suppliers do not need any external support for any type of innovation. In contrast, in the beer sector external knowledge for process development is even searched on the European level.

Hence, hypothesis 12, that external knowledge sources are located at different geographical scales, depending on the type of knowledge, can be confirmed.



**Figure 11: External knowledge sources for product, process, market and organizational development in the Belgian cheese sector; Scores: 1=no need for external support, 2=Local, 3=Regional, 4=National, 5=Europe, 6=Outside Europe; FC=Focal company, C=Customer, S=Supplier; N=45; Source: own data**



**Figure 12: External knowledge sources for product, process, market and organizational development in the Belgian beer sector (FC=Focal company, C=Customer, S=Supplier; N=45, Source: own data)**

Scores: 1= no need for external support, 2=Local, 3=Regional, 4=National, 5=Europe, 6=Outside Europe

## 5. Conclusions

In this report we show that the innovation capacity in the Belgian traditional food chains is on average. However the applied innovation activities are significantly contributing to the business success of the firms in the traditional food chains.

Furthermore, we show that the collaboration activities are also on average for the Belgian traditional food chains and that the main joint activities (collaboration) within the chains are sharing systematically knowledge and joint planning of activities. However, we found a certain disagreement between the statements of the food manufacturers and their suppliers and customers. This disagreement might be due to a different perception of the joint activities by the three different chain members. Further, collaboration for joint R&D is carried out more often with 3<sup>rd</sup> parties than with peers.

Related to the research hypotheses, significant correlations were found between higher collaboration levels and increasing chain performance. Furthermore, a strong relationship was found between higher collaboration levels and increasing chain trust in the beer sector. Although, this relationship was not statistically significant, it was still close to a significant level of 90%. And finally, it could be confirmed, that external knowledge sources of traditional food companies are located at different geographical scales, depending on the type of knowledge.

The results of this report must be interpreted with care, due to the limited sample size of 30 chains. In a larger sample, for instance when the results are investigated over the three investigated countries, the results could turn out to be more statistically significant. Moreover, another limitation could be that the choice of the suppliers and customers was made by the food manufacturers. The high trust levels among the chain members might be due to that most food manufacturers have probably chosen their “favorite” supplier/ customer, with whom they have a rather good

relationship. Hence, the results of this report might not show a representative picture of the bottlenecks and success factors in Belgian traditional food chains.

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# HUNGARY

## 1. Introduction

The main purposes of the research were to understand and measure the bottlenecks and success factors of traditional food products and to develop a method, which is suitable for their determination.

To achieve the main goal the innovation and collaboration were measured through the resource availabilities, the changes for improvement implemented by the traditional food supply chain members and the joint activities between the supply chain members and between the supply chain members and third parties.

The applied method was questionnaire survey, which was conducted in Italy, Belgium and Hungary. In this cross-cultural survey the same research method, questionnaire, recruitment criteria and data collection, analysis method were used.

In each country 15 chains were selected for both selected products that are 15 focal companies and one of their suppliers and customers. This means that 30 supplier-focal company-customer triplets were interviewed.

In Hungary traditional fermented sausage, processed white paprika and typical, traditional bakery products (scones, Danish pastry curls with cocoa) were targeted supply chains.

## 2. Research hypothesis

- H1) Different cultural backgrounds and political systems lead to different levels of and innovation capacity of SME's.
- H3) At traditional foods innovation in convenience, packaging, labeling, logistics, market is more acceptable than innovation in production/processing. However process innovation is acceptable if the key process and the key product attributes will not be changed.
- H4) Organizational innovation leads to higher supply chain performance
- H5) More intensive collaboration with other organizations in the supply chain (e.g. in terms of product, packaging, process improvement and development of related services and marketing) leads to higher innovation capacity.
- H6) Higher level of integration in the supply chain leads to higher level of innovation capacity
- H7) A minimum level of trust is necessary for collective activities (research, marketing, shared use of resources)
- H8) A higher level of trust leads to more intensive collective activities (research, marketing, shared use of resources)
- H9) Collective activities (collective research, collective marketing, collective purchasing and collective use of resources) lead to better use of resources.
- H12) External knowledge sources of traditional food companies are located at different geographical scales, whereby the geographical scale will depend of the type of knowledge.

## 3. Methodology

### 3.1. Data collection method

The applied method was questionnaire survey through face-to face, self registered and phone interviews. The combination of the different techniques was necessary to reach the target group and increase the respondent rate. In all cases the respondents have opportunity to clarify the misunderstandings related one or two questions.

In order to avoid any data collection biases and missing data interviewers were checked by field supervisors, especially the completed questionnaires by logical aspect.

By asking the respondents which way they prefer to take part in the interview the majority of them (cca75%) have chosen phone interview.

In the case of less available respondents we applied the self-registered questionnaire so the questionnaires were filled in by the respondents and the answers not clear were discussed with them by phone. The application rate of this method was 20%.

The third method the face-to face interview was applied in a very small rate (5%) because the travel time and costs are higher than that of the phone interview and the respondents were not motivated to organise meeting for the interview. By using of face-to-face interview the communication with the respondents was better, than by phone, because there was opportunity for clarification of misunderstandings.

### 3.2. Description of sample

The three selected supply chains in Hungary were:

- **dried fermented sausage** supply chain

Campden and Chorleywood Kht. Recruited companies according to the recruitment criteria from a database of Hungarian fermented sausage manufacturers, who were asked to select one of their suppliers and customers. From dried fermented sausage supply chains 11 forming triplets were ready to answer to the questionnaire.

- **processed white paprika products** supply chain

Campden and Chorleywood Kht. Recruited companies according to the recruitment criteria from a database of Hungarian white processed paprika products manufacturers, who were also asked to select one of their suppliers and customers. As a result of it 5 complete white paprika supply chains were ready to answer to the questionnaire.

- **traditional bakery product** supply chain (scones, Danish pastry curls with cocoa)

The willingness taking part in this survey was significantly lower in the case of processed white paprika than in dried fermented sausage, therefore traditional bakery product supply chain was also involved in this survey.

Focal companies were recruited from a database of traditional bakery product manufacturers, who selected one of their suppliers and customers. As a result of it members of 14 complete were ready to answer to the questionnaire.

It is important to mention that sometimes the same supplier or the same customer was identified in different supply chains (same additive supplier of the dried fermented sausage or same large retailer as customers). In order to avoid biases the contribution of one chain member/respondents was limited to maximum 3 in the different chains.

The classification of the sample, divided in the 3 selected traditional food chains in Hungary, is shown in Table 1.

**Table 1: Composition of sample of the interviewed supply chains**

Type of company	Number of companies in the sample		
	Dried fermented sausage	White paprika	Traditional bakery products
Focal company	11	5	14
Supplier	11	5	14
Customer	11	5	14

**Table 2: Classification of sample by size of the company**

Enterprise category	Number of employees	Number of companies in the sample		
		Focal companies	Suppliers	Customers
Medium	< 250	15	13	13
Small	< 50	12	10	10
Micro	< 10	3	7	7

### 3.3. Questionnaire

The questionnaire that we used in the survey had different types of questions connecting to innovation capacity and collaboration.

#### 3.3.1. Innovation

*Human efforts* were described by the amount of time that companies turn on different training activities (courses, self study, seminars, fieldwork, experimental trials).

*Financial efforts* were described the type of the budget of product development, process development, market research and organisational development.

*Innovation activities* were described by different type of activities. These activities were grouped in following way: product innovation (packaging, quality, convenience), market innovation (entering new markets, marketing activities), organisational innovation (new management tools, improving of management of R&D, participation in networks).

*Results of innovation* activities were measured on 7-point likert scale.

#### Collaboration

*Collaboration with partners* means using production equipments jointly with partners, sharing knowledge systematically, and joint planning of different activities.

*Collaboration in R &D* was explored as well. We asked companies to choose with whom they have joint R & D.

### 3.4. Data analysis

The data were analysed by a number of methods described below. Summary statistics were applied to determine the potential directions and methods for final analysis.

Different types of scales that were used for data capture are shown in Annex (Table 3.). The composition of the questionnaire and coding of the data enabled us to characterize the level of innovation capacity and collaboration by very simple way.

Innovation capacity: In case of human efforts, financial efforts and results of innovation the higher scores, while in case of innovation activities the higher numbers of “yes” answers shows higher innovation capacity. The mean of the scores of human efforts, financial efforts and results of innovation and the sum of innovation activities that the companies introduced in the last 3 years were determined for each stakeholder and after that was averaged/summarized for the whole supply chain.

The innovation capacity score was introduced in the following ways. The mean of the scores of the human efforts, the financial efforts and the results of innovation and the sum of innovation activities was standardized.

$$0 \leq \frac{x - \text{minimum}}{\text{maximum} - \text{minimum}} \leq 1$$

The average of the standardized scores of the four variables were determined. This score describes the innovation capacity of a supply chain. If this value is 1 it has maximal innovation capacity, if it is 0 it has minimal innovation capacity.

Collaboration: Scores describing the collaboration were summarized for each participant and for supply chain. Scores were standardized by the above-mentioned method. This collaboration score describes the level of the collaboration of a supply chain. If this value is 1 it collaborates very well if it is 0 the partner in the supply chain do not collaborate at all.

Kruskal-Wallis test ( $\alpha=5\%$ ) was used to establish if there are significant differences between stakeholders regarding to their innovation capacity or level of collaboration. Mann-Whitney test ( $\alpha=5\%$ ) was used to explore differences between 2 independent variables (eg. Between focal companies and suppliers, or between focal company and customers).

The relationships between variables was analysed with correlation. Hierarchical cluster analysis was used to identify supply chains with different level of collaboration.

The SPSS® 16.0 for Windows statistical software was used for the evaluation of the data.

## 4. Results

The Part 4.1 shows the results of summary statistics of innovation competence and collaboration and summarizes the comparison of the answers of the different stakeholders. The discussion of results follows the main topics of the questionnaire. The research hypotheses are discussed in Part 4.2.

### 4.1. Summary statistic of innovation competence and collaboration

Innovation is understood as new products, new process, new markets and new organisational methods, this is the reason why we explored the human and financial efforts that companies invest into these activities.

#### Human efforts

Human efforts can be describe by the time devoted to trainings, self-study, seminars, fieldworks or experimental trials. (Table 5.)

#### *Trainings and courses*

Nearly half of the focal companies have trainings and courses once a year or in every 6 months. A similar pattern can be observe in case of the customers as half of them indicated that take part in trainings one or two times a year. On the other hand the suppliers show different pattern, as nearly 70% of them answered that they participate in courses at one or 2 times a year. In case of the focal companies 33,3% of the respondents answered that they never participate in trainings. This rate was slightly higher in case of the customers (40,7%) and lower for the suppliers (17,2%).

#### *Self-study*

Self-study is more frequent in case of the suppliers than the customers and the focal companies. More than half of the suppliers indicated self-study one or more times a week, while this rate for the focal companies (28,6%) and the customers (17,9%) is lower.

#### *Seminars*

Most of the customers (70,4%) indicated that they do not take part of seminars, while this rate is much lower for the focal companies (29,6%) and the suppliers (25%).

#### *Fieldwork*

The participants carry out fieldwork mainly in every six months or once a year. Beside this a significant proportion of suppliers (27,6%) and customers (21,4%) indicated that they have fieldworks at least once a month.

#### *Experimental trials*

Regarding to the experimental trials the customers have very different response pattern compared to the focal companies and the suppliers, as most of them (70%) do not participate in experimental trials.

#### Financial efforts

The type of resources that was spent on product development, process development, market research and organizational development can be used to characterize financial efforts. (Table 6.)

### *Product development*

Most of the suppliers and the customers spent their financial resources on product development according to necessity in 2007; while the majority (70%) of the customers did not have resources budgeted for this purpose.

### *Process development.*

Most of the suppliers (70%) budgeted their resource according to necessity on process development. Nearly half of the focal companies budgeted process development according to necessity, while this rate was only 25% for the customers. Majority of customers (60,7%) and 30% of the focal companies did not spent money on process development in 2007.

### *Market research*

Majority of the focal companies and the suppliers spent money on market research according to necessity. 39,3% of the customers did not have resources budgeted on market research, 39,3% of them spent money on market research according to necessity, and 21,4% of them had yearly budget for market research.

### *Organizational development*

The suppliers mainly spent money according to necessity on organizational development. Nearly half the focal companies did not dedicated resources on organizational development, or spent their resources according to the necessity. Majority of the customers did not spent money on organizational development.

### Resources availability ( See Annex Table 7.)

### *Product development*

The suppliers and the focal companies mainly get support for their innovation activities from national level, while the majority of the customers do not need external support.

### *Process development.*

Majority of the focal companies get support from national level, while the suppliers get assistance from European and national level as well. Majority of the customers show clearly different response pattern, as they indicated no need of support.

### *Market research*

Majority of focal companies get help from national and regional level, for market research, while the suppliers use assistance from European and national level as well. 44% of the customers indicated no need of help.

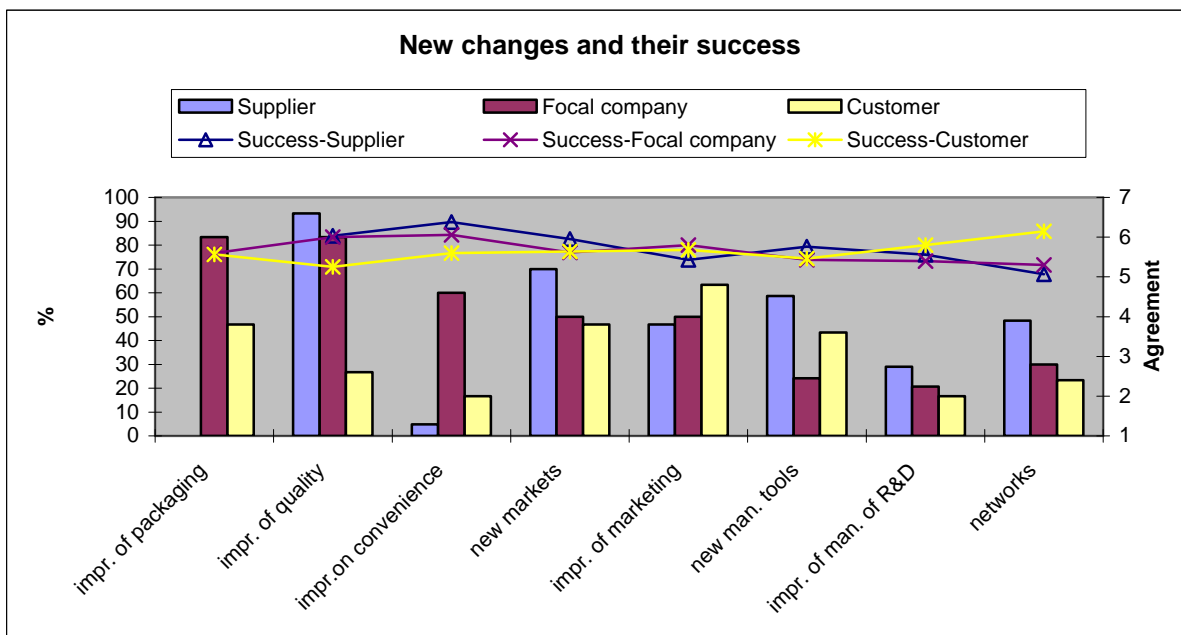
### *Organizational development*

Nearly half of the participant indicated they do not need external help for organizational development.

### Introduction new changes and their success

We asked the participants that what kind of changes were introduced in the last 3 years. The respondents evaluated its success as well. The relationship between the new changes introduced by the suppliers/focal companies/ customers and the success is showed in the Figure 1.

Figure 1. Innovation activities and their success



Most of the focal companies *improved packaging* of their traditional product in the last 3 years. This type of change was less frequent in case of the customers. Improving quality was an important issue for suppliers and focal companies; while just a low percent of the customers answers that they put emphasis on *improving quality*. 60% of focal companies *improved the convenience* of their traditional products. *Improving marketing* was the most frequent change in case of customers. *Improving of management of R&D* and *participating in networks* were less frequently introduced changes.

Most of the participant evaluated the changes being successful. There are not remarkable differences among the answers of different stakeholders.

### Collaboration

The stakeholders, who were involved into the survey, do not use production equipment jointly with other chain members. The half of the focal companies answered that they share knowledge systematically with their suppliers and customers. On the other hand, the majority of the suppliers and the customers regularly share their knowledge with the focal company, which show a slight unbalance in the flow of information. The focal companies more frequently plan joint activities together with their customers, than their suppliers.

The percentage rate of collaboration activities between the partners is highlighted in the Table 16. The focal companies (36,6%) and the suppliers (40 %) prefer 3<sup>rd</sup> party organisation as partner in R&D, while only few customers answered that they carry our R&D with 3<sup>rd</sup> party organisation. We can state that the percentage rate of collaboration is fairly low between the focal companies and their customers (10%), between the suppliers and food manufacturers from the aspect of the suppliers (20%) and from the aspect of the manufacturers (14,4, %). (See Annex Table 16.)

The customers carry out research and development mostly with the focal companies.

To sum up, the innovation capacity and the level of collaboration of the chain members were different. The differences are highlighted in Table 8. The scores of the human efforts, financial efforts and innovation activities are significantly higher for suppliers and focal companies, which suggest that the focal companies and the suppliers are more innovative than the customers.

There was significant difference between the levels of collaboration of the chain members. The scores given by the suppliers were significantly higher than the scores of focal companies and the customers. The results let us conclude that the suppliers can be characterized with higher level of collaboration than the focal companies or customers.

Table 8. Comparison of innovation capacity and level of collaboration of different stakeholders

Factors	Focal company (mean value)	Supplier (mean value)	Customer (mean value)	Asymp. Sig.*
Human efforts	3.0 A	3.3 A	2.4 B	0.020
Financial efforts	2.0 A	1.9 A	1.6 B	0.016
Innovation activities	4.4 A	3.8 A	2.8 B	0.008
Innovation results	5.6	5.6	4.8	0.363
Collaboration	0.28 B	0.56 A	0.34 B	0.000

*Kruskal-Wallis test –[if Asymp. Sig. (2-tailed) < 0,05, significant difference can be observed between levels]  
Variables with same letters do not differ significantly.*

## 4.2. Discussion of research hypotheses

*H1) Different cultural backgrounds and political systems lead to different levels of and innovation capacity of SME's.*

The effect of different cultural / political systems background will be compared in the summary report.

*H3) At traditional foods innovation in convenience, packaging, labeling, logistics, market is more acceptable than innovation in production/processing.*

The most frequent innovation activity was the improvement of quality. 67,8% of the participants improved the quality of their traditional products through selected ingredients, raw materials, better uniformity of the product. The improvement of the packaging was a frequent change as well, 65% of the respondents had this type of innovation recently. On the other hand the changes connecting to the marketing, or entering new markets was less frequent as approximately half of the respondents introduced these types of changes. Only 40% of the companies improved the convenience of their traditional product. On the basis of the results we cannot conclude that at traditional foods the innovation in convenience, packaging, labeling, logistics, market is more acceptable than innovation in production/processing. (See annex Table 9.)

*H4) Organizational innovation leads to higher supply chain performance*

We compared the standardized scores of supply chain organisational innovation (new management tools, improving of management of R&D, participation in networks) with the supply chain performance scores that were determined in WP 5.3. There was not significant correlation between variables, thus Hypothesis 4 is rejected. (See annex Table 10.)

*H5) More intensive collaboration with other organizations in the supply chain leads to higher innovation capacity.*

On the basis of correlation analysis we can conclude that there is significant but not strong positive relationship between collaboration and innovation capacity (See annex Figure 2, Table 11.). Hypothesis 1 is accepted because more intensive collaboration results higher level of innovation capacity.

*H6) Higher level of integration in the supply chain leads to higher level of innovation capacity*

The vertical integration level of supply chains was determined in WP 5.3. The scores that show the level of vertical integration in the supply chain were compared to innovation capacity. There was not significant correlation between variables, thus we reject that higher level of vertical integration result higher level of innovation capacity. (See annex Table 12.)

*H7) A minimum level of trust is necessary for collective activities (research, marketing, shared use of resources)*

Hierarchical cluster analysis was used to determine supply chains with different levels of collaboration. A low and a high performing group could be distinguished. We compared the level of the supply chain trust of these 2 groups. There was no significant difference in level of collaboration between the clusters with different levels of trust. (See annex Table 13.)

*H8) A higher level of trust leads to more intensive collective activities (research, marketing, shared use of resources)*

The supply chain trust – that was measured in WP 5.3 – was compared with collaboration score. Interestingly we have found a significantly negative but too strong relationship between trust and collaboration. (See annex Table 14., Figure 3.)

*H9) Collective activities (collective research, collective marketing, collective purchasing and collective use of resources) lead to better use of resources.*

Collaboration scores did not show correlation with supply chain performance score, so we reject that collective activities lead to better use of resources. (See annex Table 15.)

*H12) External knowledge sources of the traditional food companies are located at different geographical scales, whereby the geographical scale will depend on the type of knowledge.*

The traditional food companies mainly get support for their product and process development from national level. In case of market research traditional focal companies get external support from national and regional level as well. The traditional food companies less frequently require support for organisational development.

## 5. Conclusions

We measured the innovation capacity and the collaboration of traditional food chains in this survey and explored the main factors that influence the innovation capacity and the supply chain performance.

To sum up, the innovation capacity and the level of collaboration of the chain members were different.

- Analysis of human efforts, financial efforts and innovation activities showed that the focal companies and the suppliers are more innovative than the customers.
- The results let us conclude that the suppliers can be characterized with higher level of collaboration than the focal companies or customers.

The most frequent changes that the Hungarian participants introduced in the last 3 years was improvement of quality through selected ingredients raw materials and better uniformity of the products and improvement of the packaging. The changes regarding to the marketing, entering new markets, and improving the convenience of the product was less frequent, so we reject the hypothesis that at traditional foods the innovation in convenience, packaging, labeling, logistics, market is more acceptable than innovation in production/processing.

External knowledge sources of traditional food companies are located at different geographical scales according to the type of the knowledge. The traditional food companies mainly get support for their product and process development from national level. In case of the market research traditional focal companies get external support from national and regional level as well.

We explored what kind of factors has influence on innovation capacity of Hungarian traditional food supply chains.

- The higher level of integration in the supply chain does not affect innovation capacity. The governance structure of the Hungarian stakeholders did not show high level of integrity, the relationships are mainly based on contract in case of the focal companies and customers, while suppliers show even lower level of integration. This can be the reason that there is not remarkable relationship between the variables.
- The collaboration has significant affect on innovation. The results show that the supply chain members that show higher level of collaboration have higher level of innovation capacity.

As collaboration proved to be an important factor, which influences the innovation capacity of a supply chain, we studied the relationship between the collaboration and supply chain trust.

- There was not significant difference in level of collaboration between clusters with level of trust.
- All types of the Hungarian stakeholders had a fairly high trust in their partners but only the supplier showed higher level of collaboration.

We supposed that the collaboration and the organisational innovation have influence on the supply chain performance but there was not significant correlation between the variables.

## 6. Annex

**Table 3. Scales used for describing innovation capacity**

<b>Innovation</b>		
	Scale used for data capture	
<b>Human efforts</b>	None	1
	Once a year	2
	Once in 6 months	3
	Once in 3 months	4
	At least once a month	5
	Once a week	6
	Several times a week	7
<b>Financial efforts/resources</b>	None	1
	Spent according to the necessity without being budgeted	2
	Distinctively budgeted on project base	3
	Distinctively budgeted on yearly base	4
<b>Innovation activities</b>	Yes	1
	No	2
	N.A.	3
<b>Innovation result contribution to success</b>	Strongly disagree	1
	Moderately disagree	2
	Slightly disagree	3
	Neither agree, nor disagree	4
	Slightly agree	5
	Moderately agree	6
	Strongly agree	7

**Table 4. Scales used for describing collaboration**

<b>Collaboration</b>		
	Scale used for data capture	
<b>Joint activities with supplier and/or customer</b>	yes	1
	no	0
<b>Joint R&amp;D activities with supplier and/or customer, peers, 3<sup>rd</sup> parties</b>	yes	1
	no	0

**Table 5. Human efforts – percentages by stakeholders**

	Stakeholders		Once a year	Once in 6 months	Once in 3 months	Once a month	Once a week	Several times a week
<b>Courses and trainings</b>	Supplier (%)	17.2	41.4	27.6	6.9	6.9	0.0	0.0
	Focal company (%)	33.3	14.8	33.3	14.8	3.7	0.0	0.0
	Customer (%)	40.7	29.6	22.2	0.0	7.4	0.0	0.0
<b>Self-study</b>	Supplier (%)	13.8	0.0	10.3	13.8	10.3	24.1	27.6
	Focal company (%)	10.7	10.7	7.1	17.9	25.0	14.3	14.3
	Customer (%)	25.0	7.1	7.1	14.3	28.6	3.6	14.3
<b>Seminars</b>	Supplier (%)	25.0	21.4	28.6	21.4	3.6	0.0	0.0
	Focal company (%)	29.6	29.6	14.8	14.8	11.1	0.0	0.0
	Customer (%)	70.4	11.1	11.1	3.7	3.7	0.0	0.0
<b>Fieldwork</b>	Supplier (%)	6.9	24.1	27.6	10.3	27.6	3.4	0.0
	Focal company (%)	18.5	14.8	40.7	18.5	0.0	0.0	7.4
	Customer (%)	25.0	7.1	32.1	10.7	21.4	0.0	3.6
<b>Experimental trials</b>	Supplier (%)	19.2	19.2	7.7	11.5	11.5	7.7	23.1
	Focal company (%)	21.4	10.7	10.7	17.9	21.4	3.6	14.3
	Customer (%)	70.4	3.7	0.0	7.4	7.4	0.0	11.1

**Table 6. Financial efforts – percentages by stakeholders**

Financial efforts	Stakeholders	None	According to necessity	On a project base	On yearly base
<b>Product development</b>	Supplier (%)	30	56.7	6.7	6.7
	Focal company (%)	10.3	75.9	3.4	10.3
	Customer (%)	71.4	14.3	7.1	7.1
<b>Process development</b>	Supplier (%)	13.3	70	16.7	0
	Focal company (%)	31.0	48.3	10.3	10.3
	Customer (%)	60.7	25.0	7.1	7.1
<b>Market research</b>	Supplier	16.7	70	13.3	0
	Focal company	14.3	60.7	10.7	14.3
	Customer	39.3	39.3	0,0	21.4
<b>Organisational development</b>	Supplier (%)	36.7	56.7	3.3	3.3
	Focal company (%)	48.3	37.9	6.9	6.9
	Customer (%)	67.9	21.4	3.6	7.1

**Table 7. Resources availability – percentages by stakeholders**

Resources availability	Stakeholders	No need for support	Local	Regional	National	In Europe	Outside Europe
<b>Product development</b>	Supplier (%)	33.3	14.8	7.4	33.3	11.1	0.0
	Focal company (%)	14.8	7.4	25.9	40.7	11.1	0.0
	Customer (%)	65.2	13.0	4.3	17.4	0.0	0.0
<b>Process development</b>	Supplier (%)	34.6	15.4	7.7	23.1	19.2	0.0
	Focal company (%)	25.0	10.7	7.1	53.6	3.6	0.0
	Customer (%)	60.0	25.0	8.3	8.3	0.0	0.0
<b>Market research</b>	Supplier (%)	33.3	3.7	7.4	37.0	18.5	0.0
	Focal company (%)	18.5	11.1	25.9	44.4	0.0	0.0
	Customer (%)	44.0	24.0	8.0	20.0	4.0	0.0
<b>Organisational development</b>	Supplier (%)	53.8	23.1	0.0	19.2	3.8	0.0
	Focal company (%)	46.4	17.9	14.3	21.4	0.0	0.0
	Customer (%)	59.1	18.2	4.5	18.2	0.0	0.0

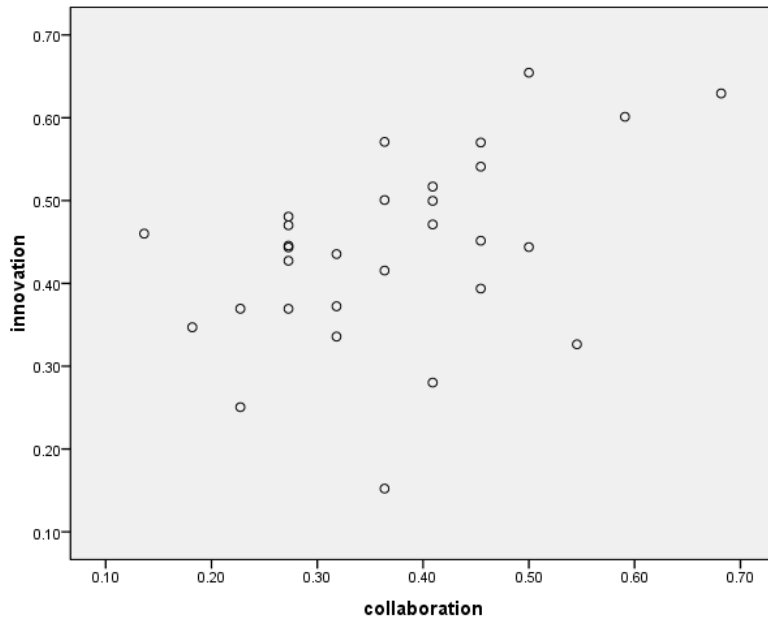
**Table 9. Innovation activities**

Innovation activities	Supplier (Counts)	Focal company (Counts)	Customer (Counts)	Sum	% Total
Improvement of packaging	-	25.0	14.0	39.0	65.0
Improvement of quality	28.0	25	8.0	61.0	67.8
Improvement of convenience	13.0	18.0	5.0	36.0	40.0
New markets	21.0	15.0	14.0	50.0	55.6
Improvement of marketing	14.0	15.0	19.0	48.0	53.3
New man. tools	17.0	7.0	13.0	37.0	41.1
Improvement of man. of R&D	8.0	6.0	5.0	19.0	21.1
Participation in networks	14.0	9.0	7.0	30.0	33.3

**Table 10. Correlation between organizational innovation and supply chain performance (SCP1)**

Correlations			
		SCP1	Q6_org_activities
SCP1	Pearson Correlation	1.000	0.106
	Sig. (2-tailed)		0.579
	N	30.000	30
Q6_org_activities	Pearson Correlation	0.106	1.000
	Sig. (2-tailed)	0.579	
	N	30	30.000

**Figure 2. Relationship between collaboration and innovation**



**Table 11. Correlation between collaboration and innovation**

Correlations			
		innovation	collaboration
innovation	Pearson Correlation	1.000	0.450*
	Sig. (2-tailed)		0.013
	N	30.000	30
collaboration	Pearson Correlation	0.450*	1.000
	Sig. (2-tailed)	0.013	
	N	30	30.000

\*. Correlation is significant at the 0.05 level (2-tailed).

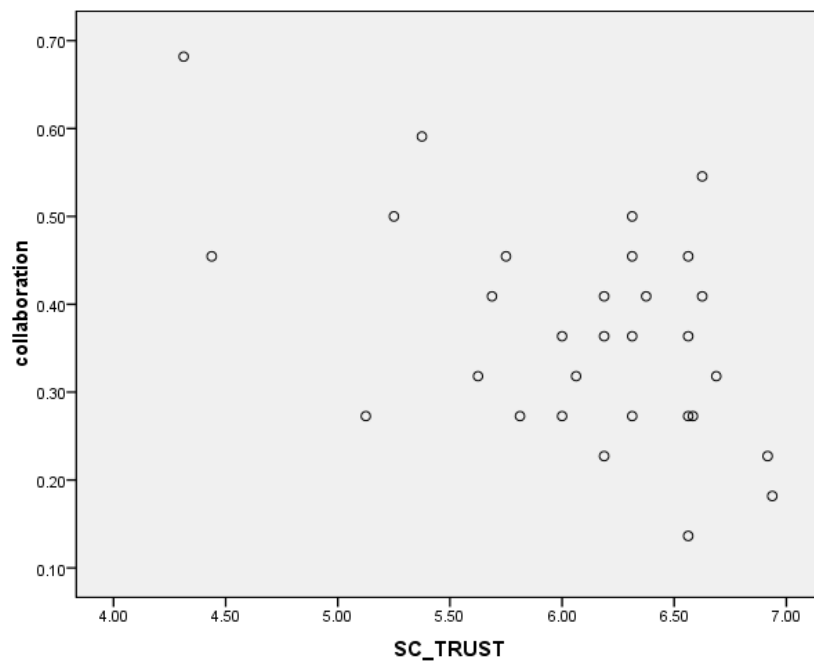
**Table 12. Correlation between innovation and supply chain integration (SC\_integration)**

Correlations			
		innovation	SC_Integration
innovation	Pearson Correlation	1.000	0.045
	Sig. (2-tailed)		0.815
	N	30.000	30
SC_Integration	Pearson Correlation	0.045	1.000
	Sig. (2-tailed)	0.815	
	N	30	30.000

**Table 13. Level of trust in clusters with different level of collaboration**

Clusters	Collaboration			Trust
	Minimum	Maximum	Mean	Mean
1. Cluster	0.14	0.41	0.29	6.26
2. Cluster	0.36	0.68	0.48	5.80

**Figure 3. Relationship between level of supply chain trust and collaboration**



**Table 14. Correlation between trust and collaboration**

Correlations			
		collaboration	SC_TRUST
collaboration	Pearson Correlation	1.000	-0.507**
	Sig. (2-tailed)		0.004
	N	30.000	30
SC_TRUST	Pearson Correlation	-.507**	1.000
	Sig. (2-tailed)	0.004	
	N	30	30.000

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Table 15. Correlation between collaboration and supply chain performance**

Correlations			
		SCP1	collaboration
SCP1	Pearson Correlation	1.000	0.021
	Sig. (2-tailed)		0.911
	N	30.000	30
collaboration	Pearson Correlation	0.021	1.000
	Sig. (2-tailed)	0.911	
	N	30	30.000

**Table 16. Collaboration activities between partners**

	Supplier				Customer				Peer				Third parties			
	Yes	No	Total	%	Yes	No	Total	%	Yes	No	Total	%	Yes	No	Total	%
<b>Manufacturer</b>	4	26	30	14,4	3	27	30	10	3	27	30	10	11	19	30	36,6
<b>Supplier</b>					6	24	30	20	6	24	30	20	12	18	30	40
<b>Customer</b>	9	21	30	30					3	27	30	10	3	27	30	10

# ITALY

## 1. Overview

In Italy, a wide variety of traditional food products have characterised the economical, social and territorial landscape for centuries. They have been tacitly codified along local, regional and national supply chains, with the active participation and judgement of consumers. They are often intertwined to give rise to traditional gastronomic recipe, as the Spaghetti al pomodoro and Parmigiano Reggiano would immediately exemplify.

They have been studied in far too numerous contributions that it's not here the place to review. We limit ourself to state the novelty and the appropriateness of a parallel multi-country comparison of compact supply chains of standard three members, a (raw material) supplier, a manufacturer (of TFP) and a distributor (customer of the producer), with respect to key issues, like their joint cooperation and innovation.

A multi-country framework has lead to an agreed questionnaire, to which 31 supply chains have answer in Italy, i.e. 93 firms, as already explained in this text and in previous analyses carried out by TRUEFOOD WP5. The research hypotheses, the methodology, and the data analysis are exactly the same as in Belgium and Hungary, with the only specification that the selected sectors in Italy have been cheese and ham. At the same time, to maintain comparability in a large enough sample of firms, the results will refer to the entire Italian dataset, without product specifications.

## 2. Results

In order to explore differences between stakeholders in the first two parts of this section the summary statistics related to innovation capacity and collaboration are presented. Following, in part three of this section, results to the before mentioned research hypotheses are discussed.

### 2.1. Summary statistics of innovation capacity in Italy

We follow the aggregation of innovation questions as related to innovation efforts (human and financial), innovation activities and results that has already been applied in this text, with values ranging from 1 (minimum) to 7 (maximum).

**Table 14: Summary statistics of innovation capacity in Italy**

Innovation capacity	N		Mean	Median	Std. Deviation	Minimum	Maximum
	Valid	Missing					
FC_efforts_human	30	1	2,70	2,80	1,35	1,00	5,00
C_efforts_human	31	0	2,15	2,00	1,12	1,00	4,50
S_efforts_human	30	1	2,88	3,13	1,31	1,17	5,00
FC_efforts_financial	29	2	1,72	1,50	0,74	1,00	3,50
C_efforts_financial	31	0	1,65	1,50	0,62	1,00	3,25
S_efforts_financial	30	1	1,80	1,63	0,65	1,00	3,00
FC_activities	30	1	5,40	5,00	2,04	2,00	10,00
C_activities	31	0	4,65	4,00	2,30	1,00	9,00
S_activities	30	1	3,33	3,00	1,42	1,00	7,00
FC_results	30	1	5,01	5,00	0,73	3,44	7,00
C_results	31	0	4,98	5,00	0,66	4,13	6,75
S_results	30	1	4,68	5,00	0,75	3,00	6,50
Total (stand.score)	28	3	0,42	0,43	0,14	0,21	0,66

Index: FC=Focal company, C=Customer/retailer, S=Supplier

By considering means, the strongest point in the chain is the innovation activity of the manufacturer (focal company), whereas the weakest is the financial effort of the customer. Throughout the supply chain, the human effort seems to be more intense than the financial effort, with supplier slightly leading the focal company in both dimensions.

The results tend to be extremely similar for the three members, with customers obtaining more than its level of activity and the focal company obtaining less than its own level.

To understand deeper these outcomes, we shall take into consideration the specific questions that have been aggregated for the four phases of innovation.

## Human effort

By reminding that all data are in a Likert-scale from 1 (minimum effort) to 7 (maximum effort), where effort is a frequency over time in the activity performed, one can see that self-study of the focal company is the most intense human effort, followed by supplier's experimental trials, self-study and others. The ordering by chain member of different types of efforts is fairly similar, with overall commitment of supplier and manufacturer higher than the customer. Particularly noteworthy is the least frequent effort: experimental trials by customers. A potential source of innovation (when in the point of sales different packages or other innovations are tested and retro-fitted to manufacturer) is evidently lost.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
F4_Self-study	30	1	7	4,17	2,17
S4_Experimental trials	30	1	7	3,67	2,14
S4_Self-study	29	1	7	3,55	2,52
S4_Other	13	1	6	3,38	1,89
F4_Experimental trials	30	1	7	3,00	2,29
C4_Self-study	29	1	7	3,00	2,30
S4_Field work	29	1	7	2,97	1,84
F4_Other	10	1	6	2,90	2,08
F4_Fieldwork	30	1	7	2,87	1,89
C4_Fieldwork	31	1	5	2,71	1,57
S4_Courses and trainings	30	1	4	2,13	1,01
C4_Other	10	1	5	2,10	1,60
C4_Courses and trainings	30	1	4	2,07	0,94
S4_Seminars	25	1	5	1,80	1,22
F4_Courses and trainings	30	1	6	1,77	1,22
F4_Seminars	29	1	4	1,72	1,03
C4_Seminars	29	1	4	1,59	0,98
C4_Experimental trials	30	1	5	1,47	1,22

## Financial effort

From a financial point of view most costly and intensive phase (e.g. by more frequently requiring formal budgeting) is the process development at the supplier, immediately followed by process development at the manufacturer and product development again at the supplier. The earlier chain members are deeply concerned with both product and process development, while the customer concentrates on organizational development and market research, the latter being very weak both at the supplier and the manufacturer's side. All these results seem quite logical but confirm that a full-fledged innovation, taking all the different aspects, would require important flows of informations about the innovation efforts taking place in different parts of the chain. If for instance customers would share the results of their financial efforts in market research, they would fill a relevant gap.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
S5_Process development	30	1	3	2,10	0,80
F5_Process development	28	1	4	2,00	1,02
S5_Product development	30	1	4	2,00	0,91
C5_Organisational development	31	1	4	1,94	0,93
F5_Product development	29	1	3	1,90	0,86
C5_Market research	31	1	3	1,77	0,88
S5_Organisational development	30	1	4	1,77	0,94
F5_Organisational development	29	1	4	1,59	0,91
C5_Product development	31	1	3	1,48	0,72
F5_Market research	29	1	4	1,41	0,87
C5_Process development	30	1	3	1,40	0,77
S5_Market research	30	1	3	1,33	0,71

## Innovation activities

Innovation activities are not graduated from 1 to 7, so their analysis will be carried out in the following pages, when commenting about a specific research question (H3).

## Results

Top results see the three members deeply intertwined, with everybody achieving (in self-declaration) high quality, the main positive result along the supply chain. The areas of improvement seem to overlap among the chain members. At the bottom, however, it's interesting to see the weakness of networking, which somewhat signals that excellence is easier reached internally than through an active involvement of others.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
C7_Improvement of quality	30	5	7	5,60	0,72
F7_Improvement of quality	29	2	7	5,59	0,95
C7_Improvement of packaging	30	4	7	5,57	0,82
S7_Improvement of quality	30	3	7	5,40	0,77
F7_Improvement of packaging	28	1	7	5,21	1,10
C7_Improvement on convenience	26	4	7	5,00	0,94
F7_New management tools	24	4	7	4,96	0,91
S7_New management tools	23	4	7	4,96	0,82
C7_Improvement of marketing	30	4	7	4,93	1,05
F7_Improvement of marketing	26	2	7	4,85	1,19
C7_New management tools	25	4	7	4,84	0,80
C7_Improvement of management practice of R&D	22	3	7	4,82	1,22
F7_Improvement of management practice of R&D	26	2	7	4,81	1,17
F7_Entering new markets	27	2	7	4,78	1,15
F7_Participation in networks	19	1	7	4,74	1,28
F7_Improvement on convenience	22	2	7	4,73	1,42
S7_Improvement of management practice of R&D	24	2	7	4,54	1,06
C7_Entering new markets	26	1	7	4,31	1,29
S7_Improvement on convenience	19	1	6	4,21	1,13
S7_Improvement of marketing	19	1	7	4,21	1,27
F7_Other	5	1	7	4,20	2,59
C7_Participation in networks	20	2	6	4,15	0,99
S7_Entering new markets	22	2	6	4,09	1,15
S7_Participation in networks	19	1	6	3,89	1,56
C7_Other	0				

## 2.2. Summary statistics of collaboration in Italy

Measured as in other country as different areas of joint activities, collaboration is particularly high only as for the sharing of knowledge and some joint planning of activities. Third parties are preferred as for R&D, whereas joint use of equipment is much less common. The more dematerialized the area, the easier the cooperation. This is a good sign for the forthcoming use of telecommunication technology, since it's easier to share at a distance knowledge – and to some extent R&D – than equipments.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
F_Sharing knowledge with supplier	29	0	1	0,86	0,35
C_Sharing knowledge with supplier	31	0	1	0,81	0,40
S_Sharing knowledge with client	30	0	1	0,80	0,41
F_Sharing knowledge with customer	29	0	1	0,76	0,44
F_Joint planning of activities with customer	29	0	1	0,66	0,48
C_Joint planning of activities with supplier	31	0	1	0,61	0,50
S_Joint R&D with 3rd parties	30	0	1	0,53	0,51
F_Joint R&D with 3rd parties	30	0	1	0,47	0,51
S_Joint R&D with client	30	0	1	0,47	0,51
F_Joint R&D with customer	30	0	1	0,40	0,50
C_Joint R&D with supplier	31	0	1	0,29	0,46
Use of equipments with supplier	29	0	1	0,28	0,45
F_Joint R&D with peers	29	0	1	0,28	0,45
F_Joint R&D with supplier	30	0	1	0,27	0,45
F_Joint planning of activities with supplier	29	0	1	0,21	0,41
S_Use of equipments with client	30	0	1	0,20	0,41
S_Joint R&D with peers	29	0	1	0,17	0,38
F_Use of equipments with customer	29	0	1	0,10	0,31
C_Joint R&D with peers	31	0	1	0,10	0,30
C_Joint R&D with 3rd parties	31	0	1	0,10	0,30
S_Joint planning of activities with client	30	0	1	0,10	0,31
C_Use of equipments with supplier	31	0	1	0,03	0,18

Index: FC=Focal company, C=Customer/retailer, S=Supplier

### 3. Discussion of research hypothesis

**H1) Different cultural backgrounds and political systems lead to different levels of and innovation capacity of SME's.**

Answer can be given only by comparing national results.

**H3) At traditional foods innovation in convenience, packaging, labeling, logistics, market is more acceptable than innovation in production/processing. However process innovation is acceptable if the key process and the key product attributes will not be changed.**

For this hypothesis the frequencies of the innovation activities related to three categories: product (packaging, quality, convenience), market (new geographical markets, marketing activities) and organization (new management tools, management practices for R&D, networking)<sup>1</sup>.

Innovation activities	Category	F	C	S	Total
Quality	product	93,3%	96,6%	100,0%	96,6%
Packaging	product	83,3%	93,5%	-	88,5%
Marketing activities	market	63,3%	71,0%	30,0%	54,9%
New management tools	organization	50,0%	48,4%	56,7%	51,6%
Convenience	product	46,7%	58,1%	30,0%	45,1%
New geographical markets	market	60,0%	41,9%	33,3%	45,1%
Management practices for R&D	organization	53,3%	32,3%	46,7%	44,0%
Networking	organization	34,5%	22,6%	33,3%	30,0%
Others		11,1%	25,0%	10,0%	14,8%

By ranking the different innovation activities in total, the strongest emphasis has been on quality and packaging (confirming the double role of intrinsic and perceived quality), with marketing activities coming third, mainly thanks to customers. All kind of innovation activities are carried out, usually with large differences in emphasis by the different actors, confirming the need of a balanced approach, making the most from their activities.

The reseach hypothesis cannot be fully confirmed.

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<sup>1</sup> All variables were measured at the level of FC, C, and S, except packaging innovation activity, which was not asked to the suppliers. The reason is, that suppliers are not expected to be active in packaging innovation in the way food manufacturers and customers are.

#### **H4) Organizational innovation leads to higher supply chain performance**

By summing up organization innovation activities (new management tools, management practices for R&D, networking) in a variable ranging from 0 to 3 (with 1 added for each activity carried out), a correlation analysis has been performed at each chain member level and overall.

The results are reported in the subsequent page. The correlation between supply chain performance (SCP) and overall organizational innovation is positive and not too weak (0.455) but is not statistically significant. It is at the same time stronger than at single member of the chain, which points at synergies in the effect. Strong and significant is the correlation between chain-level and focal company organizational innovation, confirming its pivotal role.

In short, the research hypothesis seems to be confirmed, but with some restraints: correlation is not causation; the two phenomena are linked, and probably conducive each other.

**Correlations**

			SCP1	orginno	FC_orginno	C_orginno	S_orginno
Spearman's rho	SCP1	Correlation Coefficient	1,000	,455	,389	,306	,230
	orginno	Correlation Coefficient	,455	1,000	,836**	,657**	,602*
	FC_orginno	Correlation Coefficient	,389	,836**	1,000	,245	,212
	C_orginno	Correlation Coefficient	,306	,657**	,245	1,000	,194
	S_orginno	Correlation Coefficient	,230	,602*	,212	,194	1,000

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

**H5) More intensive collaboration with other organizations in the supply chain (e.g. in terms of product, packaging, process improvement and development of related services and marketing) leads to higher innovation capacity.**

**Correlations**

			innovation	collaboration
Spearman's rho	innovation	Correlation Coefficient	1,000	,759**
		Sig. (2-tailed)	.	,000
		N	28	25
	collaboration	Correlation Coefficient	,759**	1,000
		Sig. (2-tailed)	,000	.
		N	25	26

\*\* . Correlation is significant at the 0.01 level (2-tailed).

This research hypothesis is strongly confirmed, with a positive, high and highly significant correlation between innovation and collaboration, with the common restraint that correlation is not causation and the direction of the link is ambiguous.

**H6) Higher level of integration in the supply chain leads to higher level of innovation capacity**

**Correlations**

			collaboration	SC_Integration
Spearman's rho	collaboration	Correlation Coefficient	1,000	-,452*
		Sig. (2-tailed)	.	,020
		N	26	26
	SC_Integration	Correlation Coefficient	-,452*	1,000
		Sig. (2-tailed)	,020	.
		N	26	31

\*. Correlation is significant at the 0.05 level (2-tailed).

This research hypothesis seems to be rejected by data, with a significant negative correlation.

**H7) A certain threshold of trust is necessary for collective activities (research, marketing, shared use of resources)**  
**and H8) A higher level of trust leads to more intensive collective activities (research, marketing, shared use of resources)**

In Italy, trust in the chains of TFP is particularly high, with a mean of 6.69 out of a theoretical maximum of 7 (Likert-scale).

**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
SC_TRUST	31	4,75	6,69	5,7728	,58023
Valid N (listwise)	31				

The correlation between collaboration and trust is quite high, positive and highly significant.

**Correlations**

			collaboration	SC_TRUST
Spearman's rho	collaboration	Correlation Coefficient	1,000	,639**
		Sig. (2-tailed)	.	,000
		N	26	26
	SC_TRUST	Correlation Coefficient	,639**	1,000
		Sig. (2-tailed)	,000	.
		N	26	31

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The hypothesis 7, that a certain threshold of trust is necessary for collaboration can be confirmed under reserve, based on the relatively high trust levels in the traditional food chains. The high correlation of chain trust and collaboration in the beer sector is an indication that hypothesis 8 is confirmed.

**H9) Collective activities (collective research, collective marketing, collective purchasing and collective use of resources) lead to better supply chain performance.**

**Correlations**

			collaboration	SCP1
Spearman's rho	collaboration	Correlation Coefficient	1,000	,612**
		Sig. (2-tailed)	.	,001
		N	26	26
	SCP1	Correlation Coefficient	,612**	1,000
		Sig. (2-tailed)	,001	.
		N	26	31

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The hypothesis is confirmed, to the extent that a high, positive and highly correlation unites collaboration and performance, with the already mentioned precautions.

**H12) External knowledge sources of traditional food companies are located at different geographical scales, whereby the geographical scale will depend of the type of knowledge.**

External knowledge sources were measured for product, process, market and organizational development on a scale with increasing geographical distance, reaching from no need for external support (1) to outside Europe (6).

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
S_Support-product development	30	1	6	2,57	1,19
C_Support-product development	29	1	5	2,55	1,06
Support-product development	30	1	6	2,47	1,20
C_Support- market research	30	1	5	2,43	1,22
S_Support-process development	30	1	5	2,43	1,14
Support-process development	30	1	4	2,03	1,07
S_Support- market research	30	1	4	1,80	1,10
C_Support-process development	29	1	4	1,79	0,94
Support- market research	30	1	4	1,77	1,10
C_Support-Organisational development	30	1	4	1,70	0,92
S_Support-organisational development	30	1	4	1,70	0,99
Support-organisational development	30	1	4	1,60	0,93

Most support tend to be local or regional, with the farthest source of knowledge for the product development at the supplier or customer. Organisational development is the most localized knowledge support, whereas market research and process development stay in the middle range.

## **4. Conclusions**

Innovation and collaboration stand at a relatively medium-to-low level in Italy, but they spread throughout the supply chain, with partners performing different roles, in terms of the area covered and effort sustained. A much higher innovation and collaboration would positively impact overall performance, with trust being a major facilitator factor.

Manufacturers play a pivotal role in maintaining innovation and collaboration, but they sustain a burden whose results are often taken by customers. A better way to remunerate innovation and cooperation activities throughout the supply chain could induce an overall larger effort, with synergic effects and better performance for all.