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# *Network learning effects of ISO 22000 standard implementation in a food SME: a case study*

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**Abstract— In the modern agrifood economies, the development of quality management standards is crucial, and food SMEs usually face difficulties in implementing them. In this context, the aim of the communication is two-fold. Firstly it is to craft an original analytical framework in line with the literature on innovation networks and related learning effects specifically devoted to the study of quality management standards implementation. Secondly the objective of the communication is to apply this framework to a specific food SME case in order to test it and to identify the key network learning effects that occur during the implementation of a quality management standard, namely the ISO 22000 standard. From this research, the practical output will be to propose tools to enhance food SMEs' innovative capacity, through an improvement of their insertion in active formal and/or informal innovation networks. These specific tools will be especially targeted towards the strengthening of learning processes and effects between the SME and the partners involved in the implementation.**

**Index Terms— food SME, innovation, learning, network, quality management standard.**

## I. INTRODUCTION

The contemporary agrifood sectors have witnessed a rapid increase in the use of intangibles, i.e. inputs built upon information, knowledge and communication assets. Consequently firms, in their move towards competitiveness, try to innovate in line with these trends. Innovations in agrifood sectors were traditionally focused around new products and new technologies, and were often seen as incremental. Innovations based upon intangibles need a broader view of what is innovation, especially in the context of food SMEs. Indeed food SMEs, whose roles in the structuration and the dynamism of the food economy in Europe are crucial, have at the same time difficulties and limitations in their innovativeness capacity for intangibles. The main objective of the communication is to better understand the conditions and processes of such innovations from a learning perspective at the micro analytical point of view, centered on small and medium enterprises. The research is focused on one type of organizational innovation, the food quality management standards.

The communication is structured as follows. In a first part (2) we characterize such innovations in food sectors around two core features: the identification of what is to be considered, in terms of resources, competences and structures, when a company adopts such an innovation; and the identification of consequences such an innovation will have in terms of behavior of this company towards its environment. In a second part we suggest addressing this question through a specific approach, thus a syncretic analytical framework is proposed (3). Then this framework is applied to a specific case study of a French food SME implementing the ISO 22000 standard within a regional initiative in France (4). Discussion and concluding comments follow (5).

## II. ORGANIZATIONAL INNOVATIONS IN FOOD SMEs

The development of food quality management standards is a major trend in the modern economy and can be explained by several key drivers. The consequences, for food SMEs, are contrasted: it brings both opportunities and threats, but in any case the innovative capacity of food SMEs is in question, especially when one considers the standard as a key dimension of competitiveness. Consequently we suggest considering the complexity of this issue of innovation adoption thanks to a focus on the network partners and on the interactions between the firms and these partners.

### A. Food quality management standards as organizational innovations: context and trends

Organizational innovations are usually defined in opposition with product and process innovations. Avermeate and Viaene [1] consider that organizational innovations usually take place when innovation is increasingly generated in networks or collaborative relationships. Science-based knowledge and technology may be involved but is not the main driver of such innovations.

The development of quality management standards is one of the major trends of organizational innovations in agrifood sectors for Henson and Reardon [2]. The main drivers of these tremendous changes are well known and can be summarized by a few key features: the need for control along the chain, the complexity of coordination problems between actors, the changing roles between public and private institutions in all the regulatory aspects of the economy (Henson and Humphrey [3], Nadvi and Wältring [4]).

First of all, the need for a better control over food safety and other types of attributes is directly related to the increased concerns of consumers about these issues. Several major food crises have undermined their confidence. It is interesting to note that at the same time the competitive pressure between firms has created a lot of opportunities for the development of new attributes, i.e. for environment, ethics, and nutritional aspects. The extension of exchanges on such complex attributes is also a driver for more sophisticated food standards. Consequently, this is not only the recognition of what is good and safe for human consumption, but instead the identification of a complete spectrum of attributes, from search to experience and credence attributes, that is to be considered.

A second feature that explains the rise of food quality standards is the need for a better coordination between firms, Schiefer [5]. The need for coordination is also linked to a context of globalization. Exchanges have progressively moved from local to national levels. Nowadays exchanges are facilitated by modern communication and transportation means and technologies. Consequently a wide range of heterogeneous and diverse connections from all across the world is brought together in business relations. The need for standardization and its recognition in different parts of the world is thus necessary.

A third feature is directly related to institutional aspects of food safety issues. As argued by researchers such as Hatanaka, Bain and Busch ([6], [7]), the literature in food quality management usually emphasizes the operational aspects. In fact we will see that a complete understanding of quality management and quality management standard adoption issues necessitates a broader view including organizational and institutional (Ménard and Valceschini [8]) as well as interpersonal aspects.

As organizational innovations, food quality management standards will affect food SMEs in many ways (Henson and Reardon [2]). From a global food chain perspective, food quality management standards will induce different forms of consolidation. Several research works have shown that other types of barriers, such as a lack of trust in food safety and food quality requirements, an insufficient connection with enforcement officers, a deficient information system, may affect the process of adoption (Gellynck, Vermeire and Viaene [9]). Another category of factors which may limit innovation adoption and prevent compliance: individual factors such as a lack of motivation or a lack of knowledge in food safety requirements. From this situation of food SMEs we suggest an interpretation of the process of innovation in terms of network and network effects. As we will see, this network dimension is a key phenomenon in innovation, and is even more important when firms are small and relatively isolated with a recurrent lack of resources and competences related to the context and to the practical implementation of the innovation.

### *B. The network dimension in organizational innovations: types and roles of partners in the creation, adoption and implementation of food quality management standards*

The first step in the analysis of organizational innovations from a network perspective is the identification of the main partners, both at organizational and at individual levels.

The main partners usually involved in food quality management standard innovations are: standardization organizations, consulting firms, other SMEs, third-party

certifiers, institutions. Let us consider their status and roles in the process of innovation.

The main organization, at the international level, devoted to food standards is ISO: International Organization for Standardization. This organization has affiliated national organizations that will represent it. In France this organization is called AFNOR (“Association française de normalisation”, French Association for Standardization), created in 1926. In 1947 AFNOR has taken an active role in the creation of ISO. Today the AFNOR group is organized around several strategic business units, including standardization *sensu stricto*, training, consulting, auditing etc.

The consultancy firms have leading roles in the development of food standards. This is a major consequence of the adoption of food standards for SMEs: the need for external stakeholders due to a lack of in-house resources and competences. These consultancy firms are usually small companies and with a high degree of expertise specialization (on technical aspects, human resource management, organization and strategy etc.). The adoption of innovations is also part of a global social phenomenon, where competitive pressure, rivalry, mimetic behavior, opinion leadership have important effects. This is especially true at local and regional levels: family-owned companies are part of social communities of business leaders with participation in clubs, forums and other sporadic social events. One can include also suppliers and customers as they will influence the process of innovation and can be important drivers for change. Third party certification is an audit mechanism by which independent auditors ensure compliance with standards. The roles and situations of third party certifiers are an active dimension of the innovation process: indeed research works (for instance Hatanaka, Bain and Busch [6], [7]) have shown that auditors can be used strategically by actors and are not neutral agents. The regional and professional institutions such as public/professional bodies have developed, in most countries, innovation policies in order to promote and help SMEs in their projects. In France, institutions such as regional innovation agencies or Chamber of Commerce and Industry (CCI) support financially and institutionally a wide range of practical initiatives around innovation issues. But how will these different partners affect innovation processes? What are their roles on one of the key features of any innovation process, namely learning aspects? How are the roles of partners related to the success (or failure) of innovation adoption? The complexity of network effects which affect strongly the way organizational innovations and learning aspects has increased. Then the question of tools and concepts useful to better understand these processes is raised. The research about networks and network forms is rapidly growing but the emerging field of the structural network analysis, through the use of common concepts and formal methods, is well appropriate for the study of highly complex phenomena such as organizational innovations.

### III. NETWORK LEARNING EFFECTS IN THE PROCESS OF ORGANIZATIONAL INNOVATION: PROPOSAL OF AN ANALYTICAL FRAMEWORK

We will briefly present the core principle of this analysis and its basic concepts and tools. A second part details the interests of such an approach for the study of network learning effects in the process of quality management standard

implementation. Then, from these theoretical backgrounds, an analytical framework is proposed.

#### *A. Innovation through networking: some principles*

The structural analysis of networks is devoted the study of networks seen as a combination of actors (or nodes) and relations (or edges or ties). The basic assumption of these researches is that actors are not independent but rather influence each other. Thus the network structure, or in other words its structural properties, makes sense and must be studied as a whole. For Borgatti and Li [11], a fundamental axiom (of these researches) is the concept that structure matters. For examples, teams with the same composition of member skills can perform very differently depending on the patterns of relationships among members. Similarly, at the level of the individual node, a node's outcomes and future characteristics depend in part on its position in the network structure. "Whereas traditional social research explained an individual's outcomes or characteristics as a function of other characteristics of the same individual, social network researchers look to the individual's social environment for explanations, whether through influence processes or leveraging processes. A key task of social network analysis has been to invent graph-theoretic properties (such as the cohesion or connectedness of the structure) and the overall "shape" (i.e. distribution) of ties" (Borgatti, Mehra, Brass and LaBianca [12]). The network approach can encompass any types of nodes (actors) or ties (links) in the research. In usual typologies of ties studied in such approaches, ties can be continuous (e. g. similarities) or discrete (e.g. money flows). These categories of ties can be applied to the two main categories of nodes, e. g. firm and individual. Ties can be directed (direction matters, such as in flows) or undirected (direction is not relevant or useless), weighted (i.e. measured) or unweighted (Wasserman and Faust [13]).

It is important to recognize that the network perspective is not a theory per se (even if it produces important concepts and notions) but a methodological approach (Conway, Jones and Steward [14], Conway and Steward [15], Pittaway, Robertson, Munir, Denyer and Neely [16]) that helps to understand complex network phenomena. This methodology can (should) be combined with other methodologies such as case study research (Scott [17]).

Coulon [18] proposed a survey of researches on innovation using the network perspective with a classification of networks in four categories, according to the characteristics of ties. Most of the research is done with unweighted ties. Coulon suggests that "when case studies are not able to capture the degree of complexity of the causal mechanisms under investigation because of the large number and diversity of the actors involved, (...) it is preferable to use a combination of case study and network analysis. It is possible that in the narrative giving a deep socio-historical understanding of the inner forces within the actors or nodes under the study the researcher misses some important relations/ties between actors. In combination with network analysis and other sources of data, it is possible that these ties could be detected much more easily, especially in large-scale networks" (Coulon [18].)

#### *B. Interests of the network approach and its implication for the study of learning effects*

As shown in the literature review, the network approach applied to the study of innovation has many interests, especially when it deals with network structure and actor's behavior. Innovation is a very complex and multifaceted phenomenon, involving different sets of actors, different flows of information and knowledge (Lam and Lundvall [19]; Cross, Parker and Sasson [20]; Conway and Steward [21]; Conway and Steward [15]).

The network approach allows the simultaneous combination of several types of ties directly or indirectly linked to the innovation processes (flows of information, money, knowledge etc). This approach adopts a multi level perspective of actors (nodes) in networks (i.e. personal/organizational nodes), and connect these different levels of analysis through the method of the linked design (Lazega, Jourda, Mounier and Stofer [10]). The embeddedness and decoupling effects (Lazega, Jourda, Mounier and Stofer [10]) must be identified for these two separate levels as they refer to specific phenomena, to be investigated by the analysis. Each level is not seen in isolation but instead in terms of interactions between levels. Another interest is that, through computation and formal methods, the approach will avoid too vague and imprecise comments. Instead it compares structural characteristics with formal methods (centrality, betweenness, etc., are usually summarized by numbers or formal indicators) linked to the results of the innovation process (success, failure, adoption rate etc., notions that can also be measured by quantitative criteria).

As shown in several research works (for instance Giuliani and Bell [22]; Cantner and Graf [23]; Chan and Liebovitz [24]; Tsai [25]) a network perspective could also help identifying different types of cognitive roles, i. e. specific roles of actors (individuals and/or organizations) in the innovation process: technological gatekeepers, strong mutual exchangers, weak mutual exchangers, external stars, champions. These typologies are built through the main structural characteristics of networks, network positions, and power in networks.

In the research on innovation applied to quality management standard implementation, there are two supplementary points of major interests that can be investigated complementarily:

- the acquisition and development of new knowledge (for innovation): this can be done through internal and external resources. This is more a question for early adopters but this is an important point in understanding how food SMEs innovate, where does it happen and why does an innovation start etc. This is a complex issue, mainly because this is related to the question of knowledge (difficult to study) and to the transformation of knowledge in real innovations. The questions of innovation phases are of particular importance. But the network perspective is of particular interest for obvious reasons: the fact that knowledge flows, that mainly come from outside the firm, must be tracked and studied as part of an 'innovation ecosystem'. It is also necessary to identify the absorptive capacity of firms towards new knowledge, and thus identify nodes' attributes (Freeman [26]).
- the diffusion of innovations, mainly between firms and individuals, reflects the fact that innovation learning is frequently done through mimetic behaviors. Firms, because of competitive pressure, will decide to innovate and to copy what is done on the market or by competitors. An important body of

literature is about this question of mimetic behaviors or follower behaviors. It is an important driver of innovation for food SMEs. These adoptions are mainly done through different types of networking activity which can be very helpful in tracking these phenomena.

Following the seminal work of Argyris and Schön [27] on organizational learning, the roles of networks and networking activity for learning have been widely acknowledged (Crossan, Lane and White [28]; Kleysen and Dyck [29]). More specifically, Crossan, Lane and White [28] identify three levels of learning: individual, group and organization, with subsequent learning processes. These authors emphasize the fact that these processes are usually, in organizational innovations, a double-loop or second-order form of learning, meaning that radical and complex changes are involved (Argyris and Schön [27].) Other works (Lundvall [30], Lam and Lundvall [19]) identify the different forms of learning under the categories of learning by doing, by using, by interacting, by spillovers effects. Learning related to the issue of innovation can also be view in a holistic manner. This is the perspective adopted by authors such as Berthon, Charreire-Petit and Huault [31]. These authors show that learning is not an isolated phenomenon. Instead, its strength is to be found in the complementarity of the network relationships seen as a stable structure, and the interacting processes that occur (mainly) at the inter-individual level. Thus emerges a view of the “networking activity” where the relationship between network and organizational learning is a “channel for learning but, recursively, that the network is transformed by the learning taking place. In other words, the network is at least partially constructed by the learning processes, dynamically, deliberately and in an emergent manner” (Berthon, Charreire-Petit and Huault [31]).

Finally, the roles of contextual variables such as proximity, either geographical or organizational, are also emphasized by authors such as Boschma [32], Bouba-Olga and Grossetti [33]. The roles of these factors are ambiguous. The status of knowledge, tacit or explicit, is one of the factors that could explain the effect of proximity in the success of learning. For Bouba-Olga and Grossetti [33] the answer to that question is to be found in a precise delineation of coordination mechanisms and mediation resources. These resources being in some cases localized, the spatial proximity of innovation processes will be favored, while in other cases innovation processes will be independent from spatial dimensions. In all cases it is necessary to integrate these elements in the analysis of learning phenomena for innovation: how do contextual factors influence the innovation process?

### *C. An analytical framework of the implementation of quality management standards*

Considering the network approach, we will consider two specific features that are of particular interests in disentangling the innovation process: the phase of innovation and the diversity of partners involved (table 1).

The adoption of quality standards encompasses different phases, from creation to wide diffusion across firms. While following an ego-network (i. e. centered on one company) approach, it is nevertheless necessary to identify what are these main phases. The specific situation of a company will then be related to these general phases, and more importantly, to the type of partner(s) that is (are) involved.

According to the literature in food quality management, Henson and Humphrey [3], there are five different phases that can be distinguished:

- the standard-setting: in other word this is the phase of creation of the standard, where the rules, definitions, procedures are formulated and written down.

- the adoption per se: an entity, usually a firm, decides to adopt a standard. This decision is of course the central and discriminating phase of the process, even if this phase is short in time, with a wide diversity of contrasted situations.

- implementation: the rule is practically implemented in one company, with the development of new competences and creation/adaptation of (new) resources. This phase is usually identified as the operational phase and could last several years in case of complex standards that will necessitate important changes.

- conformity assessment: this is the phase that will bring compliance with the standards, the respect of procedures, rules, and lists of specification. The conformity can be assessed by many means, and from a network perspective this is important to acknowledge the extreme diversity of organizational configurations. Usually there are two broad means of assessing conformity: self-assessment and by a third party. But inside these two categories the roles, statutes and functions may differ.

- enforcement: this phase will define the means and procedures that allow the execution of engagement, either through sanctions or through incentives. The enforcement phase can be implemented by the firm itself but also other organizations, specialized or not in this role. The State can also be an enforcer for mandatory rules.

While considering simultaneously these five functions and the main categories of food standards, it appears that the distinction between public and private on the one hand, and mandatory and voluntary on the other hand, becomes clearer. This distinction must be emphasized because of its implication for a network approach of quality management standard adoption. The diversity of partners and relationships are also to be considered. Indeed the diversity and heterogeneity of partners involved come along with the succession of phases. This heterogeneity is mainly linked to the complexity of the innovation process when the adoption is not based on a short term innovation such as market innovation or when partners are mainly homogeneous entities such as in product innovation. For the adoption of quality standard, the innovation process is (or can be) both long in time and conducted with diverse entities. In parallel with this diversity, the content of ties can cover the complete spectrum of possibilities: money and information exchanges, knowledge transfers, social interactions and social exchanges.

In considering these two components (of phases and partners), we propose the following table 1, crossing the phases with the type of partners involved. From these components the table emphasizes the specific learning effects that could be related to the concrete situation of the company. Indeed, for each innovation phase the network characteristics of the process are detailed, in terms of focal entity and network partners, network relationships, and their consequences in terms of learning effects. The framework is thus a heuristic mean to put the focus on the specific learning phenomena that will occur during the implementation process.

TABLE 1  
PHASES OF INNOVATION AND PARTNERS IN QUALITY MANAGEMENT  
STANDARD IMPLEMENTATION:  
CHARACTERISTICS AND NETWORK LEARNING EFFECTS

<i>Phase in quality management standard implementation</i>	<i>Roles and importance of learning in each phase</i>	<i>Focal entity(ies) and partners in the network</i>	<i>Description of exchanges and/or interactions of situational characteristics</i>	<i>Network learning Effects</i>
<ul style="list-style-type: none"> <li>•Standard setting</li> <li>•Adoption</li> <li>•Implementation stricto sensu</li> <li>•Conformity assessment</li> <li>•Enforcement</li> </ul>	<p>Awareness Emulation</p> <p>Knowledge transfer</p> <p>Resource transfer</p> <p>Knowledge building</p> <p>Knowledge co-construction</p>	<p>Major entity(ies), both at individual and organizational levels in each phase + all partners that have been in relation with the focal entity(ies), whatever their roles</p>	<p>Nature of exchange and/or interactions : levels of actions, contents, time dimension, institutional embeddedness.</p>	<p>Identification of learning characteristics and effects</p> <ul style="list-style-type: none"> <li>-position effects</li> <li>-coupling effects</li> <li>-spillover effects</li> <li>-roles of 'champions'</li> <li>-density effects</li> <li>-embeddedness and cultural influences</li> <li>-roles of proximity (geographical, organizational, cultural...)</li> </ul>

#### IV. A CASE STUDY OF INNOVATIONS IN A FOOD SME IMPLEMENTING A QUALITY MANAGEMENT STANDARD

After a presentation of the general principles of the case study research, followed by a synthetic presentation of the Paris Caramel company and of ISO 22000 standards the framework is applied to this case in considering globally the network effects at the two levels: individuals and organizations and then the time dimension, i. e. the impact of innovation phases.

##### *A. Methodology: case study approach, research protocol and presentation of the Paris Caramel case*

The methodology is developed in the spirit of Yin's [34] case study approach. Following Yin, the selection of the case study is done with an objective of an analytic generalization. This approach of analytic generalization is relevant when "a previously developed theory is used as a template with which to compare the empirical result of the study" (Yin [34].)

The research protocol in the approach is based on interviews, which is, according to Eisenhardt and Graebner [35], the best option to deal with such complex questions. Thus several face-to-face interviews with quality management services, CEO and consultants have been conducted. This information has been completed by secondary data about the environment, the quality procedures and the market characteristics relevant to the case study.

Founded in 1957, Paris Caramel is a food SME in the Picardie region in Northern France which belongs to the chocolate and confectionery industry. The company manufactures three main types of products of the highest quality: caramel, fruit pulp and chocolate, for a turnover of 900 000 Euros a year. The customers are pastry confectioners, delicatessen and shops selling local products. The company has forty employees,

mainly makers of caramels, fruit jellies and chocolate candies. In year 2000, the company decided to develop the certification of various stages of the production process, started with HACCP. As a small family-owned company with mostly self-educated staff, Paris Caramel is very cost-efficient with a short decision process. Another important characteristic of the company is its human dimension: human capital is more important than financial returns, and the managers put more emphasis on training their employees and on maintaining employment than on profits.

In spring 2007, the Chamber of Commerce and Industry (CCI) decided to launch, for ten regional food companies (including Paris Caramel) organized in an informal "ISO 22000 club", a regional program to support ISO 22000 standards. This ISO 22000 program has consisted in business leaders' coaching along with accompanying collective actions for all participating companies. Indeed the Paris Caramel's management decided to embark on the process of certification because of new customers' requirements and changes in the business environment. The certification was not an absolute necessity for this healthy company but appears as a possible supplementary marketing asset in accordance with the policy of sustainable customer satisfaction ensuring the safety of products sold. It would also eliminate the different and heterogeneous customers' specifications and create differentiation towards competitors. The certification also facilitates the implementation of a structured approach that involves all the staff in a process of continuous improvement. Finally Paris Caramel got the certification for ISO 22000 standard in October 2008.

ISO and its member countries used the quality management system approach and tailored it to apply to food safety requirements, incorporating the widely used and proven HACCP principles into the quality management system. The resulting standard is ISO 22000. In September 2005, the standard was officially launched. Thanks to this new standard, HACCP and ISO 9001 are combined in an integrative manner, from upstream to midstream and downstream activities. ISO standard 22000-2005 specifies the requirements for food safety management system when an organization in the food chain needs to demonstrate its ability to control food safety hazards in order to ensure that food is safe at the time of human consumption. It is applicable to all organizations, regardless of size, which are involved in any aspects of the food chain and want to implement systems that consistently provide safe products. The means of meeting the requirements can be accomplished through the use of internal and/or external resources. More specifically, ISO 22000 standard has the following objectives: to plan, operate, maintain the quality management standard; to demonstrate compliance with requirements; to evaluate and assess customer requirements; to communicate food safety issues to the relevant interested parties; to demonstrate such conformity and to seek certification.

##### *B. The implementation of ISO 22000 standard: network learning effects at organizational and individual levels*

The global configuration of network ties and of their learning effects are summarized in table 2 and 3. The tables show a well balanced distribution of ties, between the four classical categories of ties identified at two levels, organizations and individuals. Let us consider successively the two levels.

TABLE 2

NETWORK LEARNING EFFECTS AT ORGANIZATIONAL LEVEL IN THE CASE STUDY

Type of ties		Content	Learning effects
Continuous	Similarities	<ul style="list-style-type: none"> <li>✓ Location in the Picardie region</li> <li>✓ Joint membership in HACCP club</li> </ul>	<ul style="list-style-type: none"> <li>✓ Spatial proximity</li> <li>✓ Cultural proximity</li> </ul>
	Relations	<ul style="list-style-type: none"> <li>✓ Competition and rivalry with other food SMEs</li> <li>✓ Mutual commitment in associations</li> </ul>	<ul style="list-style-type: none"> <li>✓ Emulation</li> <li>✓ Cultural proximity, congruence of goals</li> </ul>
Discrete	Interactions	<ul style="list-style-type: none"> <li>✓ Interactions with consultancy firms</li> <li>✓ Commercial relations with customers</li> </ul>	<ul style="list-style-type: none"> <li>✓ Learning by doing (initiation)</li> <li>✓ Learning by exchanging</li> </ul>
	Flows	<ul style="list-style-type: none"> <li>✓ Knowledge transfer from AFNOR</li> <li>✓ Money transfer from CCI</li> </ul>	<ul style="list-style-type: none"> <li>✓ Learning by exchanging</li> <li>✓ Supporting</li> </ul>

## ✓ Organizational level

Continuous ties such spatial (the location in the Picardie region, the role of the Regional Council) and cultural ties have been acknowledged by the company as important features, as they provide trust and easy communication. The tacit knowledge dimension of the standard is also to be considered: for that type of knowledge, considered as soft information, organizational proximity is sufficient. For the responsible in charge of the implementation at Paris Caramel, the institutional embeddedness of the initiative, promoted both by AFNOR and by the Chamber of Commerce, has played a crucial function in providing seriousness and credibility.

The congruence of goals between all the stakeholders of the initiative, creating a specific relationship and a sense of responsibility, provided the ground for mechanism such as emulation, and mimicry. Indeed these effects can be considered as learning effects as well, in reinforcing/auto promoting the exchange of skills and information.

The learning by doing effects have been identified mainly between the consultancy firm and Paris Caramel: the role at that organizational level is significant at the initiation stage (establishment of a first contact and of a formal tripartite contract between the partners), but the main interaction effects have occurred at the individual level.

## ✓ Individual level

The inter individual aspects of the network learning effects are more difficult to evaluate for confidentiality reasons, nevertheless there is a clear complementarity of the continuous ties between the two levels, leading to strong coupling effects. The managers from Paris Caramel (the CEO, the quality responsible) are part of a coherent community of leaders in the Picardie region and everybody knows each other quite well. This fact has played an important role in the decision to adopt, as we will see in the following paragraph. But the individual level is also of a tremendous importance for learning in terms of discrete ties: interactions, mainly with the consultant, but also with other food managers during the period of the CCI initiative as well as with some customers, being intense and conditioned by a strong mutual understanding.

TABLE 3

NETWORK LEARNING EFFECTS AT INDIVIDUAL LEVEL IN THE CASE STUDY

Type of ties		Contents	Learning effects
Continuous	Similarities	<ul style="list-style-type: none"> <li>✓ Antecedents of contacts with business leaders</li> <li>✓ Comparison with other food business leaders</li> </ul>	<ul style="list-style-type: none"> <li>✓ Cultural influence</li> <li>✓ Personal emulation</li> </ul>
	Relations	<ul style="list-style-type: none"> <li>✓ Informal exchanges with other managers</li> <li>✓ Informal relationships with professionals about quality management</li> </ul>	<ul style="list-style-type: none"> <li>✓ Learning by mimicry</li> <li>✓ Learning by interacting</li> </ul>
Discrete	Interactions	<ul style="list-style-type: none"> <li>✓ Interactions with consultants</li> <li>✓ Personal interactions with buyers</li> <li>✓ Personal interactions with public bodies</li> </ul>	<ul style="list-style-type: none"> <li>✓ Learning by individual exchanges</li> <li>✓ Learning by interacting</li> <li>✓ Learning by interacting</li> </ul>
	Flows	<ul style="list-style-type: none"> <li>✓ Flow of information from competitors</li> <li>✓ Flow of information from the environment</li> </ul>	<ul style="list-style-type: none"> <li>✓ Informal exchanges</li> <li>✓ Learning by inter individual influences</li> </ul>

## C. The implementation of ISO 22000 standard: network learning effects over innovation phases

## ✓ Organizations

Organizations involved in the process of standard adoption are: AFNOR, CCI, consultancy firms, other SMEs.

-AFNOR, the French ISO affiliated organization, has a central role in the definition of ISO 22000 standards. But this role can be qualified as highly differentiated, according to the phase of innovation. In the initial phase of creation, AFNOR has a leading role, but it is interesting to notice that Paris Caramel is not involved at all. In the phase of initiation, AFNOR has played a more contrasted role: thanks to its leadership and size, AFNOR always plays a central role in awareness of companies. But its actions are mainly oriented towards large companies. In the adoption phase AFNOR has no specific role. During the implementation phase, AFNOR provides its expertise and acts as a training entity both for companies and for consultants.

-The CCI (Chamber of Commerce and Industry) had no role in the definition phase. Its action is crucial in the adoption phase: the organization has acted as a pivotal organization between AFNOR, consultancy firms and SMEs, through the program funding and the set up of the tripartite contracts.

-Consultancy firms: Protechnic, a consultancy firm, had a central role in the adoption stricto sensu phase. It is difficult to separate its role as a company and as a person. Indeed the manager of the company has been largely convinced by the consultant to adopt the standard. But the company has also a very good experience and reputation at working with SMEs. The specific expertise is at the basis of the successful interaction process.

-ISO 22000 club for SMEs: this club is the heir of another previous club devoted to HACCP. Its role has been to connect companies from different industries (thus not in competition) to exchange views and questions about the standard and its

consequences. Its role is both formal (membership) and informal (interpersonal relations, cf. below).

-Third party certifier: the certification body Veritas has conducted the certification process and has been the main player, with Paris Caramel, during the conformity assessment phase.

#### ✓ Individuals

The roles held by individuals are more difficult to acknowledge. Informal contacts and exchanges may occur at any time and, for confidentiality and privacy reasons, interviewees are reluctant to answer. Nevertheless interpersonal contacts between Mr. and Ms C. from Paris Caramel seem to play an important role especially with one consultant Ms N. and with all the managers from the ISO 22000 group.

-Consultant: Ms N., through her experience, played mainly a role of coaching. Ms N. put in evidence the interest of a certification and convinced the managers: the standard will improve the customer satisfaction and will enhance the customer confidence with better food safety conformity.

-SME managers within the ISO 22000 club: 10 managers from different companies seem to have played a crucial role in exchange and in creating a mutual emulation between the business leaders.

According to the analytical framework, the learning effects are different from one phase to another. We will consider successively the five main phases, namely standard setting (antecedents), decision of adoption, implementation *stricto sensu*, conformity assessment (certification), enforcement (post certification). During the standard setting phase, only limited network learning phenomena occurred, at the individual level, in the form of previous personal experiences of the quality manager of Paris Caramel in similar fields. Indeed, no formal contacts between the company and AFNOR has existed, showing that during its definition, the ISO 22000 standard does not include all potential users such as food SMEs. The adoption decision is done thanks to contact between the company and CCI: the learning effect can be defined as the rise of awareness of the company leaders involved in the initiative in the development of the standard and soft information exchange for the establishment of the tripartite contract. The implementation phase is obviously the period of time (almost 2 years) that has witnessed important learning phenomena. The most important learning phenomena has occurred at the interindividual level, in the form of a strong interaction between the quality manager and the consultant in charge of the program. The formal explicit knowledge included in the ISO standard specifications necessitates adaptations and translations in the real world of the Paris Caramel specificities. On the contrary, formal contacts between organizations are limited during this period of time. Another significant network learning effects are the permanent contacts between the food managers involved in the initiative, in terms on comparisons, informal exchange and emulation.

The conformity assessment phase is more formal: this is the recognition of the compliance with specification, done through a certification audit. The process of learning is done through an exchange of explicit information (such as files, information control procedures etc.) between the company and the certifying body.

The enforcement phase is the post certification period of continuous improvement. Learning effects occur mainly in-house, with the practical involvement of the employees. Nevertheless, the informal contact established during the implementation phase with other managers remain active, in the form of informal meetings, cross auditing practices and informal exchanges.

## V. DISCUSSION AND CONCLUDING COMMENTS

The objective of the communication is twofold: (i) to craft and propose an original framework for the analysis of one type of organizational innovation, i. e. the implementation of ISO 22000 standard, in using a network learning perspective; (ii) to apply this framework to a specific food SME in order to identify concrete learning phenomena at the network level. The major motivation is the fact that the implementation of a quality management standard is a long and complex process strongly related to its organizational and individual context. Quality management standards are immaterial in nature and difficult to implement: food SMEs and their managers will inevitably rely heavily upon their partners, stakeholders, institutional environment to adopt it.

Preliminary results, still to be confirmed and extended to other cases, could have interesting managerial implications for food SMEs. First of all, the collective (i. e. network) dimension of the process is shown. No food SMEs in this initiative could have decided in isolation to set up ISO 22000 standards. Instead the food company of our case study is strongly embedded in a web of partners, defining a networking activity for innovation. Within this network, the process of learning is doubly collective: at the institutional level, where institutions (Chamber of Commerce and Industry), consultancy firms and AFNOR have worked together to promote the initiative; at a micro analytic level, with the SME (i. e. Paris Caramel) building a strong relationship with a consultancy firm and as part at the same time of a community of food business leaders, with its own dynamics, objectives and social interaction mechanisms. A second idea is that of resources. The critical success factor, in the quality management standard implementation in Paris Caramel, seems not to be financial resources, but instead cognitive resources, i.e. the ability to connect and to be connected, through a web of relationships, to the relevant people and organizations. Learning phenomena appear to be complex, multifaceted and done through several mechanisms and mediation. Consequently an important managerial implication of the research, to be validated by other situations, would be to enhance these cognitive resources and mechanisms, to identify more precisely their nature, the partners involved and their specific roles for learning in relation with the requirements of the different phases of the innovation process.

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