Hidden facets of IT projects are revealed only after deployment

The case of French agricultural cooperatives

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Abstract

Purpose – The purpose of this paper is to focus on an information technology (IT) deployment project in the specific field of agricultural cooperatives. It also aims to underline the importance of the IT implementation phase, but also the pre-implementation phase.

Design/methodology/approach – A four-year canonical action research project was conducted within a network of more than 300 agricultural cooperatives. Research was carried out both during the IT implementation and after deployment. Key information was gathered through unstructured and unofficial interviews, observations, field notes, meetings, focus groups, and documentary analysis.

Findings – Despite user resistance behavior, the findings show that information systems (IS) implementation may lead to unexpected results that extend beyond the tool's initial objectives. Indeed, four hidden facets of the tool were revealed: inductor, symbol, pretext, and reference.

Research limitations/implications – Although the research is limited to one single-case study, it puts the emphasis on in-depth research, vs cross-sectional data collection, to analyze the relationship between IT implementation initiatives and organizational intelligence. Furthermore, the authors argue that while IS literature has separately developed related theories (actor-network theory, competitive intelligence), the authors conceptualize a whole theoretic system interrelating the two above-stated theories.

Practical implications – The implication for IS practitioners is that, by focusing only on experiences that have occurred during IT implementation, one may disregard critical information, behaviors and knowledge from unforeseen effects that have occurred after implementation. In future IT projects, IS managers therefore need to capitalize on post-implementation knowledge, through sociology of translation and competitive intelligence, in order to anticipate potential diversions from the initial objectives. Finally, while most IT implementation methods tend naturally to manage resistance maximize users' satisfaction and to reduce potential resistance, the authors support an alternative approach. It consists into enhancing resistance in order to anticipate and resolve latent resistance behaviors directly or indirectly related to the project.

Originality/value – Despite widespread literature on resistance, appropriation or acceptance during IT projects, there is little research that addresses the impact of IT projects on organizational intelligence, and the kind of behaviors that lead to its failure or success. In the case, the implemented IT tool revealed hidden structural and organizational roles, which were unanticipated by IT designers and managers.

Keywords Action research, Implementation, Post-implementation, Collective intelligence, Actor-network theory, Organizational intelligence, Canonical action research

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1. Introduction

Research in information systems (IS) provides us with extensive knowledge of information technology (IT) implementation initiatives in firms. For instance, one of the key reasons for failure is resistance and conflict between future IT users (Bou Saba and Meissonier, 2016). The failure of IT projects may sometimes lead to drastic consequences that impact organizational intelligence. By "organizational intelligence" we mean the ability to solve problems within a group of individuals through collaboration, where organizations are able to recognize their problems through collective action. IT tools in companies can upset future users, become a significant burden for firm employees, and can be a catalyst for user resistance (Klaus and Blanton, 2010). The task-technology fit depends on the way a tool is used and is congruent with the tasks and strategy. Accordingly, the literature cites active change management styles as a way to reduce human resistance and conflicts during or after IT implementation (Barki and Hartwick, 2001). Moreover, the IS literature shows that humans may resist IT and use it at the same time.

The literature on IT implementation and its impact on organizational intelligence is rich (Saba *et al.*, 2014). However, the diversity of the proposed approaches makes it difficult to identify situations in which IT use has allowed firms to become "smarter" at the organizational level (Muhalmann, 2003; De Vaujany, 2005). Following the deployment of a collaborative IT tool, for instance, it is difficult to assess if experiences of the implementation, whether positive or negative, have been capitalized for future purposes. In other words, it is important to focus on the phase of IT implementation, but also the phase after implementation. IS managers need to anticipate potential diversions from the initial objectives in their future projects, by understanding the impact of IT implementation initiatives on organizational intelligence. Aside from the above-stated theories, and this time on a sociological scale related to the actor-network theory (ANT) approach (Latour, 1986), the sociology of translation complemented by the competitive intelligence theory, may disambiguate the link between IT use and organizational intelligence (Saba *et al.*, 2014). It remains to be seen if this is possible.

The paper is structured as follows. A literature review analyses ANT and the conceptual basis of competitive intelligence. A brief recall of user resistance literature will also be discussed, and a complementary approach that synthesizes ANT and competitive intelligence will be presented. The study presents the results of a four-year canonical action research (CAR) project conducted at the Regional Federation of Agricultural Cooperation in the Languedoc-Roussillon (FRCA LR), a leading French federation of agriculture cooperatives. First, our observation reveals that the collective intelligence tool, called COOPERFIC, was successfully designed and implemented in accordance with the initial objectives defined by the FRCA LR. The tool, however, contained numerous technical imperfections, and the organizations witnessed several resistance behaviors during its implementation. Second, through the actor-network approach, the translation operation induced interactions that led to four different sociological outcomes. The latter facets were unintentional, and were not expected at the beginning of the project.

The tool provoked interactions with its environment, leading to four unexpected sociological events that somehow impact organizational intelligence, which are summarized in "the square of collective intelligence." Accordingly, beyond the intended objectives of IT initiatives, in post-implementation phases IT tools may lead to unintended strategic effects called surprise effects, despite the tools' imperfections. The paper invites IS researchers and managers to capitalize on post-implementation knowledge through competitive intelligence, in order to anticipate potential diversions from the initial objectives in future IT projects. The latter experiences may turn out to be key processes embedded in the future IS design.

2. Literature review

Our literature analysis, based on psychology and sociology theories, explores the relationship between ANT and competitive intelligence, whereas IS literature tends to develop related theories separately. Simply contrasting both concepts in the context of IT implementation would reinforce this "isolationist tendency." Accordingly, we propose an integrative approach that includes concepts related to IT implementation as a comprehensive theoretic system. IS research includes theoretical approaches to technology resistance, acceptance, fit, diffusion, and adoption after IT implementation. Within the Social Science Citation Index (Williams *et al.*, 2009; Dwivedi *et al.*, 2012), more than 350 papers were published on these theories over the past 20 years. To illustrate and discuss technology acceptance, many models such as the theory of reasoned action, the technology acceptance model (TAM), the theory of planned behavior, and the unified theory of acceptance and use of technology, as well as a mix of some of these models, have been employed by IS researchers (Ajzen and Fishbein, 1975; Ajzen, 1991; Venkatesh and Davis, 2000; Venkatesh, 2000; Venkatesh *et al.*, 2003). Most of the influential theories stated above have the strength of focusing jointly on the benefits of IT use from the psychological perspective of individuals after deployment. Accordingly, most of this research was conducted empirically after IT systems had been implemented in the firms. These can be considered to be observations made on downstream results of the upstream resistance process. Consequently, many acts of resistance are related to users having to cope with the "non-appropriateness" of IT. Few empirical studies have investigated how individual and group resistance emerges and evolves during earlier stages of the project (Lapointe and Rivard, 2005). However, negotiations during IT implementation can raise affective-oriented resistance if users perceive threats to their values or power relationships due to the expected organizational changes. Focusing on the pre-implementation phase is thus important, as managers need to anticipate potential conflicts and user resistance that could lead to project failure (Meissonier and Houzé, 2010).

Moreover, our analysis, which is based on competitive intelligence and ANT, considers that studying only resistance or acceptance behaviors is not sufficient to assess the impact of IT projects on organizations, especially in pre-implementation phases. Furthermore, while a lot of research in psychology and IS has discussed how such behaviors affect IT projects (De Dreu and Weingart, 2003; Jehn and Bendersky, 2003; Lapointe and Rivard, 2005; Meissonier and Houzé, 2010; De Wit *et al.*, 2012), less research in IS has explored the role of competitive intelligence in the IT implementation process. Competitive intelligence is the process of acquisition, production, and transformation of information into useful knowledge for the company to make improvements in various areas. A company can improve its decision-making processes, image, its ability to influence, to create value, seize opportunities, strengthen its competitiveness, innovate, detect threats, prevent risks, ensure the safety and security of its members and partners, and enhance and protect its assets (Besson and Possin, 2004). Our explicit focus is to apply the competitive intelligence dimension to our chosen field.

Theories that explore user resistance at different phases of IT implementation have witnessed development over the past decade (Lapointe and Rivard, 2005; Ferneley and Sobreperez, 2006; Bhattacherjee and Hikmet, 2007; Kim and Kankanhalli, 2009; Meissonier and Houzé, 2010; Klaus and Blanton, 2010; Van Offenbeek *et al.*, 2013). Behavior is the key dimension of resistance (Lapointe and Rivard, 2005). Joshi (1990) states that resistance occurs when a person perceives a situation to be inequitable, and views the changes involved with an IT implementation project, in relation to personal or group matters, as responsible for such unfairness. User resistance is more specific than overall resistance to change, because it consists of employees interacting with a system (Klaus and Blanton, 2010). Klaus and Blanton explain that user resistance reflects the

opposition of users to a system implementation during the implementation. According to Coetsee (1999), user resistance may be manifested in two main forms. These forms are described in Table I.

2.1 ANT

ANT provides a framework to understand the implementation of innovation projects in the field of IS. The word "actor" refers not only to humans, but also to any object that may have a role in the establishment of a network that helps with the implementation of an IT project (Callon and Latour, 1981). Considering innovation as unpredictable and uncertain, ANT takes into account sociological factors that would influence IT implementation initiatives. Therefore, it is necessary to conceptualize actors as both humans and non-humans. Accordingly, ANT seems to be appropriate in order to understand the issues that occur during IT projects, where interactions between technology and social actors are strongly influenced by social factors. From a theoretical point of view, we assume that the success or failure of an IT project could be explained using ANT. This would help us to observe the IS design process, while taking into account the positions of all actors, either in favor or against the implementation of this tool, in a specific business environment. Accordingly, ANT is based on human/object interactions that are the bases for the creation of networks. These interactions can be seen through "the model of translation," defined by Callon and Latour (1981) as the negotiations, acts of persuasion, calculations, and violence behaviors that are expressed by an actor who acts on behalf of another actor. Occupying a central place in the ANT approach, the translation model consists of power mechanisms that underlie the construction of heterogeneous networks formed by human and non-human actors. According to Callon (1986, 1991) and Akrich *et al.* (1988a, b), the translation process occurs in four steps: problematization, where the nature of the problem in a specific situation is defined by an actor and there is an establishment of dependency; interessement, which involves assigning other actors into the roles that were proposed for them in the actor's program, to resolve the latter problem; enrollment, where the roles that were assigned to other actors during interessement are defined; and mobilization, which involves ensuring that the spokespersons properly represent their collective entities.

The use of ANT, and more precisely the translation model, is the most suitable approach to apprehend IS implementation projects, because it allows us to take a global view when explaining IS projects, which corresponds to the implementation of the COOPERFIC tool. Nevertheless, despite its usefulness, the translation model approach seems to be insufficient in explaining definitively the results of our research in all its phases, because it does not capture the flow of unrevealed information or weak signals. Moreover, within the context of competitive intelligence, the actor-network could remove any ambiguity a priori, in the sense that, beyond the initial intentions, the implementation of the tool induces by itself structural effects. Yet, in the context of competitive intelligence, and beyond the initial expectations of the IT being implemented, the very act of deploying an IT tool in a network of cooperatives would lead to organizational and structural effects. Therefore, we discuss the theoretical framework of competitive

Form	Description
Passive resistance	Resistance occurs due to technology-related factors, such as user interface, security, ease of use, performance and the degree of centralization
Active resistance	Resistance occurs due to the backgrounds, traits and attitudes of individuals or groups toward technology

Table I.
Forms of resistance

intelligence by placing a particular focus on the "three levels of informational intelligence" model (Brute De Remur, 2011), which was recently developed by researchers in management science (Figure 1).

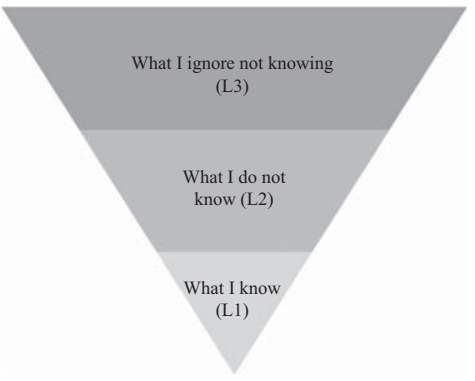
2.2 Competitive intelligence

Among the many definitions of competitive intelligence available in the literature, we refer to the definition of Nicole Almeida (2001) who considers competitive intelligence as it is more an art of circumstances than a science (Almeida, 2001). Capturing circumstances, in this research, is a sense of discernment in terms of informational intelligence. Indeed, informational discernment may lead to intelligence when it comes to choices and decisions, and may therefore lead to organizational intelligence. According to Almeida (2001), competitive intelligence is an art – it is somehow a quest for perfection. The art of circumstances is something that refers to waiting. Circumstance would be a favorable time for managers to make decisions, even if they do not know in advance what these decisions will be. According to the same authors, firms are not able to capture all the important information (relating to circumstances) that is circulating around them. Therefore, firms condemn and then reject information, since they know information may not fit with the original objectives – even though firms do not always know exactly what they are seeking. Hence, many weak signals, if taken into consideration, can be a reflection of the strategic information circumstances that are circulating inside or outside organizations, with no purpose or without being revealed. Competitive intelligence therefore consists of not letting information pass by – so that, when least expected, this information can be transformed into strategic decisions that promote organizational intelligence.

By this logic, Brute De Remur (2011) proposes the "three levels of informational intelligence" model.

The first level of informational intelligence refers to in-house informational assets. At the first level, information may be solid and consist of tools, software, documents, and other devices (Brute De Remur, 2011).

The second level concerns information that we consciously ignore, and therefore tend to acquire. We know where this information can be found, thus, we know which tool we must mobilize to get it. In order to find what one is looking for, one must know what they need. Then, one must collect information to fulfill their needs, analyze information and then disseminate it in order to achieve their desired goals (Brute De Remur, 2011). This is shown in the cycle of competitive intelligence (Figure 2). In other words, the second level of



Source: Brute De Remur (2011)

Figure 1.
The three levels of informational intelligence

Source: Brute De Remur (2011)

Figure 2.
The cycle of competitive intelligence

informational intelligence represents proactive performance: it is about targeted monitoring, and requesting research on a topic, subject, or project.

Finally, the third level of informational intelligence is achieved by developing an attitude and culture by being active receptors. This involves combining the information collected at any time with the two previous levels of informational intelligence (Almeida, 2001). This level of informational intelligence is possible to achieve, given the abundance of information that flows in and around the company. It is important to achieve the third level of informational intelligence if one wishes to increase organizational intelligence in today's hyper-competitive global context. This can be compared to "serendipity," the art of finding what we are not looking for. It is about general monitoring, where information is potentially meaningful to the organization. At this level, we shift from management of information to management by information.

2.3 Actor-network and competitive intelligence: a complementary approach

Our theoretical approach is therefore customized and specific. It refers to a transversal discipline, in this case competitive intelligence, which converges with the translation model of the actor-network approach, insofar as the fulfillment of the aims to which the organizations aspire. It passes through interactions between different actors and through the production and use of strategic information, which maintains the competitiveness of structures. Therefore, we consider that the actor-network approach has two facets. The first has been shown to be necessary but insufficient in terms of informational integration. Yet the second facet, in the context of competitive intelligence, appears to correspond to the first two levels of Brute De Remur's (2011) informational intelligence model. In other words, in terms of the second facet, the four steps of the translation model (problematization, interessement, enrollment, and mobilization) would relate to the "What I know" and "What I do not know" levels, in the sense that, if we apply these four steps, we can reach the knowledge that we are seeking.

The third level relates to the art of what we are not looking for, or, more precisely, "serendipity." In other words, it is the "What I ignore not knowing" level. Within this frame, we are typically at the core of competitive intelligence, in the sense that we are in a position to capture weak signals and/or attain unrevealed or unexpected information. Therefore, in our study, the first two steps alone are insufficient to solve the problem at hand.

We believe that also using the competitive advantage approach, especially its third step, after implementation could clarify the link between IT project initiatives and organizational intelligence. Accordingly, we formulate the following research proposition:

P1. IT project initiatives lead to interactions between actors and foster organizational intelligence, regardless of the positive or negative behaviors occurring during implementation.

In the next part of our paper, we verify our specific theoretical and methodological approach, and explain the results of our research.

3. Case description

The Regional Federation of Agricultural Cooperation in the Languedoc-Roussillon (FRCA LR) is a federation, founded in 2006, that represents a network of more than 300 territorial agriculture cooperatives, based in southern France. Its purpose is to promote the activities of the cooperatives to professional organizations, governmental departments, local authorities and national and European authorities. It also provides solutions to the specific operational and developmental needs of the cooperatives. Additionally, it conducts various development missions, consulting, auditing, and training sessions for their benefit. At a time when agriculture is at a very important turning point in its history (with heightened international competition, the rise of emerging countries, enlargement of the European Union, and unprecedented crises in viticulture and fruit and vegetable production), and when cooperatives of the Languedoc-Roussillon region are increasingly engaging with alliance and merger operations, it became essential for the FRCA LR to develop a collective intelligence IT tool, and suggest it to the member cooperatives. At the beginning of the project, the tool had three main objectives: providing managers of the agricultural cooperatives with a dashboard of key indicators (economic, social, commercial, and environmental), specific to each sector; allowing managers to find out their position in relation to other cooperatives in the region, and compare the regional average of similar cooperatives within the same sector; and building and implementing a comprehensive online administrative directory of agricultural cooperatives, to promote relationships between leaders of agricultural cooperatives, while at the same time follow the development of the regional agricultural cooperative perimeter.

4. Method

CAR is a popular method frequently employed to conduct empirical research within the IS discipline. It is applied research which aims to develop a solution that has practical value to both researchers and organizational practitioners (Davison, 1997). CAR tackles real-world problems and enhances firm's performance by mixing scholarly observations with practical interventions (Davison *et al.*, 2012). One cannot understand human behavior without understanding the work environment within which individuals interpret their thoughts, feelings, and actions (Meissonier and Houzé, 2010). Unlike quantitative data measurements where social facts have an objective reality, the complexity of our research field posits a socially constructed "reality" apprehended with qualitative data. Social phenomenon in firms evolves with time, which justifies the higher adequacy of qualitative process analysis over quantitative static analysis. Finally, the purpose of AR is to take actions in order to change the current situation and its unsatisfactory conditions. Accordingly, the CAR method is an interventionist approach that permits to understand feelings, values and perceptions that underlie, influence behavior and induce change.

Problem identification calls for action and CAR acts as a liberating agent of change (Susman and Evered, 1978; Baskerville, 1999 Du Poy and Gitlin, 1998, Davison *et al.*, 2012). CAR is: cyclic, as iterative steps recur in a longitudinal time frame (four years, in our case),

generating knowledge to engage in further actions; participative, as organizational practitioners and researchers collaborate in partnership as co-researchers, where stakeholders are full participants in the research process, or where practitioners serve as both subject and researcher; qualitative, operating more through verbal conversations than numbers; reflective, because critical feedback on the process is essential to each cycle and is used to design subsequent steps and actions; and responsive, as it reacts and adapts to the findings from each previous cycle. The research design of Susman and Evered (1978) is one of the most popular CAR methods used in the social sciences. Davison *et al.* (2012) identified four challenges related to the role of the theory and how it contributed to intervention.

Davison's *et al.* (2012) revised CAR model is similar to Susman and Evered (1978) in relaying on a cyclical process of five steps: diagnosing, which consists of identifying issues in the firm; action planning, developing alternative solutions to solve the issue; action taking, corresponding to the chosen solutions; evaluating the consequences of the actions; and specifying learning outcomes and general findings that have resulted from this cycle. It is most likely that the process of our CAR will follow an iteration of many cycles, which correspond to key phases of the IT implementation. While other research methods could have been used to analyze this phenomenon in its natural context, CAR was the most appropriate because of its interventionist approach, which is dedicated to the development of knowledge that is useful to research and practice (Susman and Evered, 1978). Additionally, the FRCA LR were eager for recommendations on IS project management, which manifested in assigning researchers in IS to help with the IT project, and was one of the motivations to use a CAR methodology. Furthermore, the FRCA LAR had a limited budget for this project and wanted to engage in such a project in-house, in order to develop and diversify the skills and knowledge of its member cooperatives. Researchers were hired to exploit empirical data that were relevant to their publication activity, so that managers at the FRCA LR could take advantage of researchers' experimentations and recommendations.

Problem-solving initiatives are used to validate or deny the applicability of theories related to the practical issues analyzed. Thus, it starts with the application of an intervention plan to solve the diagnosed problems in the chosen firm. This intervention plan is guided by a theoretical perspective. It indicates how the planned changes will address the diagnosed problems and hence improve the organizational situation (Davison *et al.*, 2012). After the application of the intervention plan, researchers can use data generated from their problem-solving activities to compare and contrast with existing IS theories, or to develop new theoretical knowledge in later-stage research activities.

Therefore, the research study at the FRCA LR seems to be predominantly focused on problem-solving. For all these reasons, this paper uses a CAR method to analyze the selected case study. Lastly, CAR considers that it is useless to study a real-world problem without also working to propose a solution (Lindgren *et al.*, 2004). We present a summary of Davison *et al.* (2012) revised CAR methodology used, as well as the results of the cyclical process of analysis that lead to a successful IT implementation, in Table II and Table III in the results section.

Additionally, our field is constantly engaging with the IS literature back and forth. The creation and observation of interactions seems to be adapted to our field because we can expect that the fundamental properties of the natural environment are that everyone agrees with this tool (collaboration is reflected by cooperation as well as interaction), while at the same time it could be expected that many reject (as a cooperative) the tool for many reasons, including social, cultural and political reasons.

In our case, we use the ANT approach, and more precisely the translation model, as a focal theory and the cycle of competitive intelligence as an instrumental theory.

First cycle (28 months)	Second cycle (20 months)
Diagnosing	
Objective: explore the existing COOPERFIC tool to understand its technical characteristics, and clarify resistance toward the first version, expressed by several opposing organizations in the network; technical upgrade and deployment of the new version	Objective: enquire about how the implementation of COOPERFIC has produced positive effects, despite negative behaviors. Find a consensus to deploy COOPERFIC on a large scale
Sources: existing documentation on the COOPERFIC project; 19 in-depth interviews with key actors at the FRCA LR; informal communications; academic literature related to acceptance or resistance behaviors	Sources: 14 in-depth interviews; direct day-to-day observations; academic literature; 29 informal meetings and discussions with managers at both opposing and advocate cooperatives
Data analysis: during several sessions with cooperative managers and key employees, direct observations, verbal and nonverbal communications were noted by the researchers	
Action planning	
Creating an online dashboard of indicators; analyzing the cooperatives' cultures; process analysis for the new version of the tool	Translation operation analysis in accordance with actor-network theory, taking into account collective and organizational intelligence. On this level of CAR, the use of translation operation analysis represents clearly the focal theory. More precisely, each step of the translation operation (problematization, interessement, enrollment, and mobilization) can be considered as a tool of the focal theory
Action taking	
The purpose is to rapidly adapt the tool's characteristics, taking into account the wishes/tasks of the "tool's opponent" organizations, then implement the new version on a large scale in the network; "Go decision" concerning the implementation of the tool	An "induction session" organized with key cooperatives (tool-opposing and advocate organizational members) to "talk" about the tool and "interact"

Table II.
Research design

Thus, the translation model and the model of the three levels of informational intelligence are complementing each other and therefore, they support the diagnostic, action planning and evaluation phases of the CAR. Our epistemological position is interpretative. Hence, we gathered information through unstructured and unofficial interviews, observations, field notes, meetings, focus groups, and documentary analysis. The following section expands on these results and discusses their implications.

5. Research results and discussion

First, between 2007 and 2009, the IT project team succeeded in designing the tool. The first implementation attempts witnessed few resistance behaviors from some users. This, however, did not impact the success of the implementation process at 39 cooperatives. The tool was called COOPERFIC. The first outcomes of the tool fit with the initial objectives expected by the FRCA LR. Namely, an online dashboard of indicators has been created, along with a benchmark module and an online directory of agriculture cooperatives in the region. Indeed, the first results provide us with an illustration of the translation process according to ANT. COOPERFIC was launched online by the end of 2009, after few ergonomic developments. Second, from late 2009 until the end of 2011, the number of member cooperatives using the tool had increased from 39 to 89 and, ever since, these cooperatives have been called "interactive." Again, it is an extension of the translation operation according to the actor-network approach. Beyond its ability to explain the project implementation, the actor-network approach has showed that the use of the translation operation succeeded in inducing interactions that can

First cycle (28 months)	Second cycle (20 months)
Evaluating	
Resistance behaviors were evaluated during unofficial individual conversations with opposing cooperatives. 15 of the opposing cooperatives had to evaluate if their main expectations were satisfied by the tool	Beyond the purposes for which COOPERFIC was designed, the very same tool has started to play an additional role between cooperatives, "inducing" and causing interactions that did not exist before the tool's implementation
Specifying learning	
Managers of opposing cooperatives stated that they cannot trust that their confidential information would be safely protected in the tool's imperfect database. Hence, they decided to reject the tool. However, during unofficial interviews, few of the opposing managers stated that they do not trust the management of the FRCA LR and prefer to "follow" the decision of the many opposing cooperatives that decided to reject the tool, for "there must be a reason for which many of them are rejecting the tool." Only 39 cooperatives have adopted the tool at the end of Cycle 1. The first implementation attempts have witnessed a few resistance behaviors from some users. The first outcomes of the tool fit the initial objectives expected by the FRCA LR. Indeed, the first results provide us with an illustration of the translation process according to actor-network theory. COOPERFIC was launched online by the end of 2009, after a few ergonomic developments	Following the COOPERFIC implementation, the tool was the means through which advocate cooperatives were able to interact with other members of the network. Consequently, advocate cooperatives were able to share key information on market conditions, as well as on the overall agricultural cooperative business and economic challenges. By the end of Cycle 2, the number of cooperatives that adopted COOPERFIC had doubled. From late 2009 until the end of 2011, the number of member cooperatives using the tool had increased from 39 to 89 and, ever since, these cooperatives have been called "interactive." Again, it is an extension of the translation operation according to the actor-network approach. Beyond its ability to explain the project implementation, the focal theory (the actor-network approach) has showed that the use of the translation operation succeeded in inducing interactions that can be summed up in four unexpected results. The instrumental theory, in other words, the model of the three levels of informational has revealed the following hidden facets: inductor, symbol, reference and pretext

Table III.
Research results

be summed up in four main results. These results were unexpected, since they were not originally intended by the FRCA LR.

The first observations we noticed after implementing the COOPERFIC tool, and observing the respective interactions, confirm that the agricultural cooperative system is irreducible in one simple expression. Even if we could have anticipated some of the tool's interactional effects with the agricultural cooperatives, it would be because our initial intentions were the same as the goals desired by the FRCA LR. In other words, we expected that managers of the cooperatives would consult the dashboards of indicators and the directory of cooperatives, and compare their averages with the regional average for the cooperatives. Indeed, these expected outcomes were reached using the focal theory. In this respect, the intentions and goals of the FRCA LR were sufficient to legitimate the implementation of our tool.

Beyond the original intentions of the FRCA LR, and if we could have known that the tool would have other effects in terms of interactions, we would not have been able to predict the nature of these results. In this sense, using the instrumental theory was necessary to reveal the nature of the other unexpected results. Indeed, the complex context of the LR agricultural cooperation, in which there have been many interactions with the COOPERFIC tool, we needed to go against the linear view often taken in management science, where causes are assumed to produce effects. However, this vision was not relevant to confirm our research proposition.

The results of interactions that we have presented in "the square of collective intelligence," discussed in the following paragraphs, confirm that we are in a complex system and, therefore, in a system of indeterminacy. In an environment of indeterminacy,

the implementation of COOPERFIC has produced opportunities despite negative behaviors (e.g. resistance toward the tool, or categorical rejection due to political issues, etc.). Discussing these results on the basis of the transversal field of competitive intelligence would lead us to the three levels of informational intelligence model discussed in the literature review.

Level 1, "what I know": the first level of the model reflected what the managers know about the economic situation of their cooperatives. Following COOPERFIC's implementation, we questioned the managers if they were able to provide information about their cooperatives. This level therefore reflects information already available inside cooperatives, and already known by managers. Information included accounting data (income statements and balance sheets), or information about stocks, current and previous sales activities, etc.

Level 2, "what I do not know": this second information level matched with the goals set by the FRCA LR. These goals reflected the needs of the member agricultural cooperatives to deal with the crisis that they were facing. The COOPERFIC tool provided each of the cooperatives with online secured access to a range of economic indicators, dashboards of different axes that allowed cooperatives to compare themselves with the regional average of the other cooperatives, and detain an online directory that would facilitate networking. Achieving these goals triggered a process of collection, classification and data analysis to disseminate the information needed. Indeed, this relates to the information cycle of competitive intelligence discussed in the theoretical section of this paper. Managers were asked to determine whether they were aware of the reality of their performance, in other words "if they really knew what they knew." Level 2 also corresponds with the validation phase of the translation process according to the focal theory, in which we managed to achieve the objectives set by the FRCA LR.

Level 3, "what I ignore not knowing": the third informational level reflected the surprise effects that occurred in the post-implementation phase. These unintentional results are shown in the square of collective intelligence (SCI) (Figure 3). Because the FRCA LR did not predict these results, and since it ignored the fact of not knowing them, the FRCA LR did not actually have access to them. Moreover, the decision to implement the tool has allowed the federation to achieve its intended objectives, as well as other goals. It marked the transition from management of information to management by information, through the translation process, despite resistance behaviors during implementation.

The stars in Figure 3 reflect the number of times the tool was an inductor, symbol, reference or pretext. Despite the equal importance of the four facets, the stars shed light

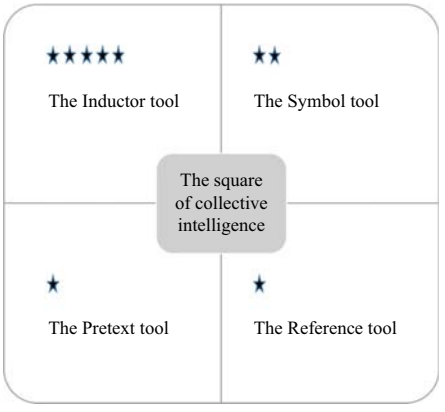


Figure 3.
The square of collective intelligence (SCI)

on where the tool had most influence. Furthermore, we discuss how the collective intelligence tool has been an inductor tool for several projects within the French and regional agricultural cooperative network. Organizational intelligence, as discussed in our paper, shows competitive intelligence to be a transversal discipline. Indeed, the purpose of collective intelligence is to enable a range of actors to share information, in order to improve one or more aspects of organizational intelligence. These tools are created to promote a form of intelligence that organizations fail to achieve on their own. Our research shows that, in our particular field, and beyond the purposes for which COOPERFIC was designed, the very same tool has played additional roles, beyond those expected – COOPERFIC was an inductor tool, a symbol, a pretext and a reference tool. In the following paragraphs we explain that, because of the tool's four facets, ANT has been successfully mobilized in a relatively short period of time (four years). If COOPERFIC did not have these additional properties, the actor-network approach could have hardly succeeded.

Following IT implementation the tool was an "inductor," because of its ability to initiate projects and initiatives through interaction. For example, COOPERFIC later provided economic risk prevention services, a reason why many cooperatives decided to adopt the tool. Thanks to its inductor effect, additional information was brought into the network that promoted organizational intelligence. Moreover, COOPERFIC was later adopted by six other Regional Federations of Agricultural Cooperatives in France. The translation process encouraged the initial actors to become spokespersons and defenders of the tool in other French regions. The tool was also used as the grounds for the launch of an electronic data exchange project in the regions. On the other hand, the tool faced significant controversies and betrayals. With the emergence of new needs, a new regional order was established, with the purpose of solving and preventing economic issues. However, the FRCA LR later joined the new order. Using COOPERFIC "symbolized" membership of this new order, but some of the agriculture cooperatives resisted the tool, stating that it was complicated to use. Other resistant actors stated that COOPERFIC offered no advantage at all. Furthermore, some cooperatives "betrayed" the FRCA LR and requested membership of other institutions, instead of using COOPERFIC, which was provided by the FRCA LR.

The tool also had a "reference" facet – COOPERFIC automatically referred to the Languedoc-Roussillon (LR) region in southern France. COOPERFIC had been requested by the LR region's president before the cooperatives were informed about the IT project initiative. The president wished to make the adoption of COOPERFIC a condition for receiving financial aid, though this condition was eventually abandoned. The COOPERFIC tool has since become the informational platform for the LR observatory of agricultural cooperation, which reflects regional willingness. Finally, the tool was used as a "pretext" – it structured and legitimized the role of the FRCA LR in the region. The tool legitimized the federation to lead economic projects in the network of cooperatives.

This experience showed us that implementing a tool of collective intelligence led to a disturbance in the historic network of agriculture cooperatives in the LR region. Like any living network, destabilizing the existing system or "way of doing" would waken hidden re-stabilization processes and engage survival mechanisms. The subsequent results, in our case, favored organizational intelligence at the network of cooperatives. COOPERFIC was launched without being sure and confident about its outcome and impact on the cooperatives. Accordingly, the number of interactive cooperatives has doubled since launching the tool online, because we have provoked the reaction of the actors. The nature of the LR agricultural network generated opportunities by itself, unexpected at the beginning of the project, which made the system more intelligent, powerful and resilient. In other words, the collective intelligence tool, COOPERFIC, created to meet the desired objectives of

the FRCA LR, successfully favored the production, circulation, and reception of information in the cooperative network. Lastly, according to the instrumental theory and coping with competitive intelligence drove us to confirm our research proposition.

6. The SCI: a tool for revealing surprising events

We highlight in-depth research using qualitative data collection, to analyze the dynamic nature of the tool's lead interactions in, and between, agricultural cooperatives. For IS managers, one should not take resistance behaviors expressed by users for granted, but understand instead the very impact of the tool's implementation on organizational intelligence, through unusual means of identification, for instance, by coupling the translation process with competitive intelligence. The SCI would be an instrumental tool for disambiguating unrevealing information through interaction that fosters organizational intelligence.

Indeed, identifying potential surprises, or unintentional effects, turns out to be necessary for change management. In our case, the number of cooperatives that adopted COOPERFIC has doubled since the very first "interaction session," because we have provoked tacit interactions between actors.

The results of our research highlight a theoretical outcome that is related to the ANT approach. Indeed, in environments that are very specific, with complex features, such as those of the LR agricultural cooperative network, the use of the translation operation succeeded in inducing interactions that we have declined in four main outcomes (the inductor tool, the pretext tool, the symbol tool, and the reference tool) that we represent in the SCI. On a theoretical level, these results confirm the idea that it is pertinent to use the translation operation as a focal approach when managing IS projects. In other words, the demonstration of our research shows that, in order to understand IS implementation in specific environments which are difficult to grasp, classical theories that rely on linear reasoning, such as establishing cause and effect relations (i.e. if I accept a tool or approve it, I must take advantage of it and then improve organizational intelligence), are not sufficient to provide comprehensive answers to research questions.

Indeed, we are faced with a theoretical contradiction, which opposes the inadequacy of these approaches in terms of apprehending our field, to a sort of adequacy or necessity of these approaches as a crossing point in our specific theoretical frame. Thus, the main contribution of our action research is the interdisciplinary and transversal theoretical crossing that we have carried out in order to apprehend the results of our field. This theoretical crossing is not limited to classical theories related to acceptance and use of technology (TAM, appropriation, resistance, etc.), nor to the actor-network approach, but extends to the transversal field of competitive intelligence. It is because of the translation operation that we have succeeded in achieving results that fall under the gaze of competitive intelligence.

7. Conclusion

In this paper, we created and observed interactions between an IT tool and a network of agricultural cooperatives, the adopters of the tool. The results of our experiment appeared in two phases: the implementation phase, between 2007 and 2009, and the post-implementation phase, when the tool was used online between 2009 and 2011. Surprisingly, implementing COOPERFIC also led to unintended effects (surprise events), which we summarize in "the square of collective intelligence."

7.1 Research implications

For IS scholars, we argue that while IS literature has separately developed related theories (actor-network theory, competitive intelligence) we conceptualize a whole theoretic-system interrelating the two above-stated theories.

The paper posits that users' resistance toward IT is not systematically negative behaviors causing project abortion. By considering resistance behaviors or technical imperfections of the tool as dysfunctional issues occurring during IT implementation, IS researchers may disregard its potential contribution to organizational intelligence, change and implementation process. Consequently, decisions made about the IT implementation can involve systems' usages very different from the ones expected by managers. Furthermore, we needed to go against the linear vision of cause and effect, which is very common in management science. Although the IT initiative faced negative behaviors (e.g. resistance behaviors, rejection due to political issues, etc.), the tool demonstrated positive facets that we placed in the SCI. These facets are the inductor tool, the pretext tool, the symbol tool, and the reference tool.

7.2 Managerial implications

By focusing on the negative behaviors that occur during IT implementation, and only these, IT project managers may disregard critical information, experience and knowledge gained from positive surprise effects that follow the tool's deployment. Such unexpected scenarios may turn out to be key processes that can be embedded into future IT initiatives. Therefore, IS managers need to capitalize on post-implementation knowledge, through competitive intelligence in order to anticipate potential diversions from the initial objectives. Since organizational systems are considered to impact IT on future actions because of their cross-functional perspective and readiness to change, we report subject evolution of the IT adoption project in the post-implementation phase.

7.3 Limitations and generalization

Our research provides an insight into IT implementation in agricultural cooperatives located in Southern France. Nevertheless, our methodology refers to the possibility to generalize a theory depending on factors that are not considered as part of the theory itself (Lee and Baskerville, 2003). For instance, the sharing of the understanding that their application of the theory serves both as an empirical test of it and as a means of solving the practitioner-defined problem (Lee and Baskerville, 2003). Respectively, the use of the focal theory through the translation operation of problematization, interessement, enrollment, and mobilization represents a theoretical setting that would lead to satisfy the initial objectives defined by the FRCA LR.

Even if our research is limited to one single-case study, our research analyzes the relationship between IT initiatives and organizational intelligence. Nevertheless, the possibility of generalization is not abandoned. Indeed, the research of Lee and Baskerville (2003) shows that there is always a way to reach a certain type of generalization. In our case, we reach the generalization type of "Empirical to Theory." More precisely, the SCI that explained our unexpected results can be also used as a lens to interpret other IT deployment projects. In other words, according to the empirical to theory model, researchers who are in charge of IT implementation projects in other organizational contexts, using the theoretical frame of collective intelligence, they would capture further results not expected initially. Even though complete similarity would not be possible in term of effects, researchers should do further analysis in order to predict the nature and the intensity of these unexpected effects.

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