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The Dynamic of Knowledge Creation in Joint Industry-Academia Research Projects: Return from Recent Action-Research Experiences in the Domain of Logistics and Supply Chain Management

Nathalie Fabbe-Costes

Abstract

The chapter focuses on knowledge processes in joint industry-academia research projects. Our experience of knowledge creation in joint industry-academia research projects in the domain of logistics and supply chain management (SCM) has led us to deepen the study of industry-academia interactions more specially the knowledge processes at work in such projects. With this perspective, we adopted an action research approach to launch and conduct two research projects in collaboration with a global manufacturing company. The chapter reviews the knowledge management (KM) literature on knowledge processes, presents the action research approach, and reports the results from the two action-research joint industry-academia research projects with knowledge creation objectives in logistics and SCM. The analysis of the projects reveals that the knowledge creation dynamic results from three intertwined, interactive, and iterative processes: knowledge transfer, knowledge sharing and knowledge generation. This outlines a framework of industry-academia knowledge processes dynamic. The analysis also underlines factors influencing the dynamic, among them action-research methodological choices and tactics. The chapter concludes on the value of action research to boost knowledge creation in joint industry-academia research projects and questions adopting a KM approach in this type of projects that could be part of the KM strategies of partners.

Keywords: knowledge processes, knowledge creation, knowledge transfer, knowledge sharing, knowledge generation, action research, reflexivity, industry-academia research project, logistics, supply chain management

1. Introduction

Joint industry-academia research projects are promoted by governments and funding agencies, and more and more companies and research centers are

engaged in this type of project. The objective is to undertake research projects mixing participants from one company (or a consortium of companies) and from a single (or multiple) academic research center(s). These research projects are supposed to benefit to every participant: boosting research and development (R&D) and innovation in companies and stimulating impactful academic research. Such projects also aim at facilitating knowledge sharing between academics and practitioners as well as knowledge creation/generation thanks to industry-academia interactions. An educational ambition is sometimes explicitly included in such projects with the objective of enhancing the competences of the parties involved in the research project through dialogue, co-working, and mutual learning.

Knowledge creation is often an expected but challenging output of such projects [1]. Most partners involved in this kind of projects expect to learn from the others. The project management often leads partners to share knowledge and the interactions during the projects sometimes end with knowledge generation. Anticipated or not, explicitly managed or not, there are knowledge management (KM) processes in joint industry-academia research projects. Even if there is no deliberate KM in the management of these projects, KM is a key issue in joint industry-academia research projects since they pose the question of who the existing and new knowledge belongs to and how can the partners use it and create value from it. More generally, these projects could (or should) have an explicit place in the KM strategies of the partners. The literature studying joint industry-academia research projects assumes these projects should end with knowledge creation, that can even be a co-creation (e.g. [1, 2]) or co-production (e.g. [3, 4]). However, the dynamic of this knowledge creation remains a black box. In line with the need for further research at a micro-level [2], the first objective of this research is to open the knowledge creation black box and study the knowledge processes at work.

There are many ways of conducting joint industry-academia research projects. Some projects, broken into work packages done separately, do not end with close industry-academia collaboration. Our experience of joint industry-academia research projects in management sciences, more precisely in the domain of logistics and supply chain management (SCM), shows that industry-academia interactions are fundamental to create knowledge valuable from a managerial and an academic perspective [5]. The key role of industry-academia interactions [2, 3] and dialogue [1] is now clearly recognized and appears critical to enhance the impact of industry-academia collaboration [4]. Therefore, it seems important to adopt research approaches that demand or at least favor these interactions that, according to [1] and [2], support knowledge co-creation. However, despite the importance of research approaches [5, 6], literature studying joint industry-academia research projects does not discuss much the role of research approaches in knowledge creation.

Indeed, many scholars consider that mutually productive form of collaboration between research and practice are the more likely to be both relevant to contemporary practice and the source of new meaningful knowledge as well as increased research impacts [4]. Action research refers to a class of research approaches focused on knowledge creation aiming at performing collaboratively embedded action and research. However, to our knowledge, little is known about the dynamic of the KM processes at work in such projects. If recent papers studying university-industry collaborations at a micro-level adopt action research (such as [1, 2, 4]), to our knowledge, none provide any in-depth analysis of the contribution of action research to the knowledge creation dynamic. This is the second objective of this research targeting at academic and professional outputs, in line with a recent call in KM literature [6].

To address the above mentioned gaps, we adopted an action research approach to deepen our understanding of the knowledge processes in joint industry-academia research projects with an explicit knowledge creation ambition. Under the umbrella of this methodological choice that leads industry and academia to interact with each other, we launched successively two research projects with a global manufacturing company. Each project addresses research questions related to core contemporary logistics and SCM issues of strategic importance for the company. Therefore, the two projects have a double objective: 1) to do the collaborative research works decided with the partner; 2) to analyze industry-academia interactions during the projects, especially the knowledge processes at work and their dynamic in terms of knowledge creation.

The research contributions are at the conceptual, methodological, and practical level. The research provides a conceptual basis to study the knowledge processes at work in joint industry-academia research projects. It also discusses action research as a valuable class of research approaches in joint industry-academia research projects. The research opens the knowledge creation black box and provides an in-depth insight of the knowledge processes and their interactions. The research proposes a framework of knowledge creation dynamic that can inspire joint industry-academia research partners in the management of their collaborative projects and KM strategies.

The chapter is organized as follows. Section 2 presents the context of joint industry-academia research projects and why it is of interest to deepen the study of KM processes in this context. A review of the KM literature focused on knowledge processes clarifies the objectives of the chapter in terms of KM: deepen the study of knowledge processes dynamics, especially knowledge creation/generation and knowledge sharing/transfer. Section 3 builds upon our experience of joint industry-academia research projects to justify the choice of an action research approach to deepen the study of KM processes in such projects. An analysis of action research approaches highlights differences and commonality. Section 4 presents and analyzes two action research projects and the knowledge processes at work in these projects. A framework of industry-academia knowledge creation dynamic and factors influencing it derive from the reflective/reflexive analysis. Conclusion underlines the value of action research in joint industry-academia research projects to boost knowledge creation. It also questions the adoption of a deliberate KM in the management of these projects that could be a brick of the partners' KM strategies.

2. Knowledge processes in joint industry-academia research projects

Subsection 2.1. presents the context of joint industry-academia research projects and why it is of interest to deepen the study of knowledge processes in this context. Subsection 2.2. examines the KM literature about knowledge processes and focuses on two of them: knowledge creation/generation and knowledge sharing/transfer. It clarifies in highlight boxes the conceptual and theoretical basis of the chapter and its expected outputs. Considering the context of joint industry-academia research projects, subsection 2.3. concludes with additional points.

2.1 Joint industry-academia research projects and KM activities

For political, economic, and pragmatic reasons, joint industry-academia research is developing. As mentioned in [5], "most funded calls for research put pressure on researchers to conduct collaborative research with companies and to produce more value for industry and society. Companies are looking for external expertise (an alternative from consultancy); they seek to diversify the partners who

participate in their open innovation processes and expect to gain useful knowledge from researchers. Academics, on the other hand, are looking for ‘problems’ with practical relevance that fit with their research interests, or theoretical challenges linked to practice issues, combined with funding... that could lead to ‘something new’ for theory, with good potential for publication or dissemination”.

Even when knowledge creation is not a goal per se in industry-academia research projects, these projects are propitious to knowledge exchanges/sharing between partners as well as to knowledge generation/creation. This explains why knowledge creation and protection are often explicitly stated points in university-industry research agreements and contracts [7].

Different types of knowledge processes are generally taken into consideration and call for specific treatments in research industry-academia agreements with regards to intellectual property. Whether knowledge creation is one of the expected outputs of a project, or, considering that interactions during the project might generate knowledge, further use of this “common knowledge” always explicitly makes part of research contracts. Even if it is generally the first to be mentioned and experienced during any collaborative research project, the question and status of knowledge sharing is less clear. To cover these exchanges, most agreements include a confidentiality section and try *ex ante* to identify the “prior knowledge” of partners to protect it.

Most partners engaged in such projects are interested by learning from others and to benefit from their knowledge. However, there is sometimes an asymmetry in the willingness to share knowledge. Industry sometimes imagines that it is possible to solve problem and/or innovate thanks to academic knowledge transfer and use, or that academics can work independently and bring solutions or innovation without interacting much with practitioners. Academics sometimes look for practice experiences to feed their research process without caring much about counterparts for practice. Collaborative research projects are challenging for both parties and the management of knowledge in these projects appears to be a key issue, although the literature does not talk much about this question.

Since our PhD dissertation and the beginning of our academic carrier, we have been doing research in collaboration with private companies and/or public organizations. Our ambition was twofold. On the one hand, we wanted to help them to solve logistics and SCM problems or to foresee their future and strategize, as well as to develop their logistics and SCM knowledge, competences, and capabilities. On the other hand, these collaborative projects were aiming at developing our knowledge base and creating significant knowledge in logistics and SCM. An in-depth analysis of our experience in joint industry-academia research projects [5] revealed the importance of industry-academia interactions to create knowledge, highlighted the role of industry-academia dialogue and co-construction, and proposed guidelines for improving dialogue and co-construction during such projects as well as quality of outputs for both parties.

This work suggested to launched new joint industry-academia research projects to deepen the knowledge processes at work, especially those ending with knowledge creation. Based on this new round of experience engaged in early 2018, the objective of this chapter is to try to better understand knowledge processes in joint industry-academia research projects aiming at producing knowledge with both managerial and academic relevance and value, i.e., being useful for companies and society, as well as being valuable from an academic point of view.

2.2 KM processes: review of the literature and research objectives in the context of joint industry-academia research projects

Knowledge Management (KM), as an area of management studies, emerged in the 1990s. Since the beginning, the study of KM processes (also called KM

activities [8]) is a core topic in KM research. There is no consensus about the number and nature of KM processes. For [9], the “four major processes consist of the process of creating the knowledge (including knowledge maintenance and updating), the process of storing and retrieving the knowledge, the process of transferring (sharing) the knowledge, and the process of applying the knowledge”. Behind the semantic heterogeneity of the terms to describe KM processes/activities, an analysis of 160 KM frameworks around the globe identifies “six broad categories of knowledge management activities which could be regarded in KM research and KM practice as general accepted basic KM activities” [10]. These categories are (ranked by frequency of presence in the studied frameworks): Share – that includes Transfer –, Create – that includes Generate –, Use – that includes Apply –, Store, Identify and Acquire knowledge.

Since we study joint industry-academia research projects explicitly aiming at creating new knowledge, “Create/Generate” is an expected core KM process in these projects. Since our intent is to favor interactions in joint industry-academia research projects, “Share/Transfer” is therefore an inevitable and somehow explicitly desired KM process in such projects, notably when partners want to learn from each other. Bearing in mind the overall list of KM processes, the research focuses on these two processes.

2.2.1 Knowledge creation/generation

Knowledge creation and knowledge generation are often interchangeably used in the KM literature. They are generally included in the same category namely knowledge creation (see [10]).

Most KM papers mention knowledge creation as one of the core activities/processes of KM. According to [11], “knowledge creation is often considered as the initial stage of the knowledge flow process”, also called “spiral of knowledge creation” [12]. Even if authors (e.g. [12]) insist on the dynamic and dialectical nature of the knowledge-creating process and on the importance of its context, knowledge creation implicitly refers in the KM literature to a deliberate production process of new knowledge. Knowledge creation, “driven by curiosity or in response to a problem, refers to the deliberate and purposeful collation of observations, data, or facts to generate new or novel ways of understanding a particular phenomenon” [13]. Here, knowledge generation appears to be a sub-process of knowledge creation, the process that ends with new knowledge.

Knowledge generation is an KM process more recently studied compared to knowledge creation [14]. In the literature focused on knowledge generation, it is viewed as a complex and rather emergent phenomenon. More precisely in [14], knowledge is viewed as constructed in practice and in context, held within individuals and collectives through nets of interaction, at once forms and is formed by activity. Knowledge generation is a knowledge process as such reflecting the emergent and construct character of organizational knowledge [15], and “the value of knowledge for organizations and their members is increasingly linked with its construction within rapidly changing, often ambiguous and very specific contexts as well as in social settings” [14].

This overview of the create/share process in the KM literature suggests that knowledge creation can be viewed as a *result* or a *process*. The *knowledge creation process* can be viewed as a deliberate and purposeful production process and/or a dynamic, complex, never-ending dialectic spiral. *Knowledge generation* appears like an emergent, uncertain, and complex process producing “sticky” knowledge [16]. Behind the difference between knowledge creation and generation lies the ontological question of the nature of knowledge. KM literature balances between an

instrumental and positivistic view of knowledge, and a systemic and constructionist view [15], assuming its distributed, localized, paradoxical, and dialectical nature.

According to our experience of joint industry-academia research projects, it is worth considering separately knowledge creation and knowledge generation. In this chapter, *knowledge creation* refers to the *result* that can be a mix of expected – thus “deliberate” – and emergent “unexpected” knowledge. *Knowledge generation* refers to the *process* that results in knowledge creation. This process can combine deliberate and/or emergent aspects. We will keep in mind the two ontological perspectives about the nature of the knowledge as well as the importance of the context of/for this KM process.

2.2.2 Knowledge sharing/transfer

Knowledge sharing is one of the most researched topics in the field of KM [11]. It is one of the most studied KM activity/process, one question being why and how people/organizations share or do not share knowledge. However, the KM literature addresses very different ways of “sharing” knowledge clearly mentioned by the words – transfer, distribution, communication, diffusion, dissemination – used in the “share” category in [10].

Many KM papers (e.g. [13]) adopt a classic sender-receiver communication approach of knowledge exchanges that can be mono directional or bi-directional. In this view, explicit knowledge (viewed like an object) can be *transferred* to an identified individual receiver or disseminated broadly to multi-individuals. Dynamic interactions (such as conversation, dialogue, sharing) call for another approach.

Knowledge transfer is an important research topic in KM. It has been studied within firms and in inter-organizational contexts such as mergers, alliances, partnerships, or open innovation/research projects. A transfer begins when both a need and the knowledge to meet that need coexist. The use of the “transfer” metaphor reflects a structural view of knowledge and the possible movement of knowledge [16], in general from an “expert” individual or organization to a “novice” one. The underlying assumption is that knowledge can be transferred through a communication channel and reused by the receiver.

According to contemporary epistemological approaches in knowledge management, “the notion of transfer is an insufficient and perhaps inappropriate objective for the development of knowledge” [14], in particular because of the stickiness of knowledge which nature is socially constructed, practice-based, context dependent, and tacitly held.

Knowledge sharing refers to situations where partners both have knowledge and find interesting to engage mutual exchanges of knowledge. Sharing is viewed as a gradual process generally including discussion and dialogue. Knowledge sharing implicitly “recognizes the complexity and elusiveness of knowledge, its situatedness, plurality, and entwinement with human understanding and interaction” [14].

Knowledge sharing is a dynamic context-dependent process [12, 15]. Therefore, the context of the process (time, space, conditions, participants, objectives, agenda, etc.) is of importance. In line with [12] and the notion of “*Ba*” (a common place or

According to our experience of joint industry-academia research projects, it is worth considering separately knowledge transfer and knowledge sharing. In this chapter, *knowledge transfer* refers to the *transmission* of knowledge while *knowledge sharing* refers to a more *dynamic, interactive, and situated mutual exchange* of knowledge. We bear in mind the importance of the context and of the “*Ba*” for knowledge sharing. Again, the ontological view of knowledge seems a key point in delineating between knowledge transfer and sharing.

space for creating knowledge), it is possible to improve the conditions of the interactions and stimulate knowledge sharing.

2.2.3 Relationships between knowledge processes

Heisig [10] mentions that KM activities/processes mutually complement each other and therefore require co-ordination. The unified model of dynamic knowledge creation in [12] also suggests the complementary nature of knowledge transfer, knowledge sharing and knowledge generation. Nonetheless, the KM literature does not develop much the relationships between knowledge processes that are often studied separately and viewed as sequential.

Our research intends to study what knowledge processes are at work in joint industry-academia research projects and to unveil the knowledge creation dynamic. Therefore, the objective is to study the relationships/interactions between knowledge transfer, sharing, generation ending with knowledge creation.

2.3 Additional considerations from the KM literature review of value in our context

The context of our study and the review of the KM literature focused on knowledge processes suggest concluding Section 2 with two additional considerations.

2.3.1 The nature of knowledge: Bridging “schools”

The KM literature, in particular some literature reviews or conceptual papers, mentions there are divergent streams of KM research linked to important questions about the knowledge definitions (and their implications), and the nature (ontology) of knowledge and KM.

Knowledge can be viewed [9] as a state of mind, an object, a process, a capability, with impact for example on how it can be observed, measured, etc. Debates about the definition and nature of knowledge has led to knowledge typologies, taxonomies, and lists of paradoxes (see “dichotomies” in [10]).

As mentioned in subsection 2.2., there are different ontological views of knowledge, leading to different epistemological approaches. A positivist approach views knowledge as an object, independent of the context, a resource that can be transferred, used. An interactionist, constructionist or constructivist approach considers that knowledge is sticky, cannot be dissociated from its context and that it is a dynamic phenomenon related to learning. The nature of knowledge led to debates (see [17]) and, according to [18], to fundamental errors in KM. There are different knowledge “perspectives” that although competing can be combined.

McIver et al. [19] bridges two theoretical schools of thought: the commodity or possession perspective (viewing knowledge as a resource or even an object) and the community or knowing perspective (a dynamic phenomenon that manifests itself in the very act of knowing something). The process of knowing highlights “the difference between *knowledge* which implies something that can be located and is independent and *knowing* which implies a process or action of knowers which is inseparable from them”. Adopting a practice perspective, [19] proposes a multidimensional view of “knowledge-in-practice” combining two dimensions: *tacitness* and *learnability*.

Bridging the epistemology of possession and of practice, [20] draws from a pragmatist approach a distinction between *knowledge*, what is possessed, and *knowing*, what is part of action and is about relation. They do not see knowledge and

knowing as competing, but as complementary and mutually enabling, and see the interplay of knowledge and knowing as a potentially generative phenomenon. “For human groups, the source of new knowledge and knowing lies in the use of knowledge as a tool of knowing within situated interaction with the social and physical world” [20]. Cook and Brown [20] emphasizes the importance of interactions and dialogue: “a conversation’s back-and-forth not only dynamically affords the exchange of knowledge, it can also afford the generation of new knowledge, since each remark can yield new meaning as it is resituated in the evolving context of the conversation”.

According to our research objectives, it is worth not choosing a knowledge view and questioning the relevance of articulating/bridging different knowledge views. The above proposals seem fruitful in the context of joint industry-academia research projects. They bolster the question of studying knowledge processes relationships/interactions.

2.3.2 *KM enablers or barriers*

The KM literature includes studies looking at success factors for KM and KM enablers or barriers.

Some papers address success factors at a general KM level embracing all knowledge processes. Heisig [10] identified four categories of context factors which are critical for the success of KM activities: 1) Human-oriented factors: culture – people – leadership. 2) Organization: process and structure. 3) Technology: infrastructure and applications. 4) Management process: strategy, goals, and measurement. Based these categories, a systematic literature review of KM literature [8] lists every KM practice improving the performance of KM processes/activities that could be useful to analyze problems or suggest solutions.

Other papers address enablers or barriers to specific knowledge processes. As examples, [12] identifies factors facilitating the process of dynamic knowledge creation, and [16] proposes a taxonomy of barriers to intrafirm knowledge transfer.

Even if the study of enablers or barriers to knowledge processes and dynamics is not the core output of our study, we keep in mind these results that could be referred to or expanded in our context.

3. Methodology of the study: action research in joint industry-academia research projects

Sub-Section 3.1. summarizes the return from experience done in [5] to justify the choice of action research to conduct joint industry-academia research projects aiming at creating knowledge. Sub-Section 3.2. presents different action research approaches stressing differences and commonality.

3.1 The importance of dialogue and co-construction in joint industry-academia to create knowledge

As mentioned before, knowledge creation, although a key aspect of joint industry-academia research projects, is not always a “common” objective nor a common proof of success. In general, academic partners are knowledge-creation oriented. They are often “charged with generating and sourcing scientific knowledge, translating this knowledge into commercial potential, and/or contributing to their community of knowledge” [7]. Sometimes companies are more focused on

the immediate transfer and use of available knowledge to obtain, in action, quick results. In such case, explicit knowledge creation with academics is often out of their scope. Conversely, academics, who look for knowledge creation and expect partitioners to share their knowledge, do not always consider the need to provide a counterpart for action. Unless they have experience of interactive knowledge creation, both partners often have a narrow view of what knowledge is (or can be), of the added value of an interactive work on and about knowledge, and of what can be its “value” both from a practical point of view and an academic point of view.

As mentioned before, the in-depth analysis of our experience of knowledge creation in joint industry-academia research projects in logistics and SCM [5] points out “the importance of industry-academia interactions, especially dialogue and co-construction, at each stage of a research project to create valuable logistics and SCM knowledge, both from a managerial and an academic point of view”.

With reference to the KM literature reviewed in Section 2, some points can be raised that call for specific research choices to deepen the study of the dynamic of knowledge creation in such projects.

Our previous study revealed the *variety* of logistics and SCM knowledge creation (in terms of result). Every project combines knowledge expected since the beginning of the project (and deliberately researched) and “surprises” emerging from knowledge *generation*.

The analysis of the projects that produced the most valuable knowledge from both points of view (academia and industry), highlights the importance of *dialogue* and *co-construction*. In launching new project, attention should therefore be paid to the willingness of the partner(s) to dialogue, and to the project context. As mentioned in [5] “despite the positive image projected by those who promote collaboration between scholars and practitioners with the aim of creating knowledge, collaborating with industry is not so easy and many academics experience difficulties related to the conflicting logics behind this type of collaboration”.

The crucial role of industry-academia *interactions* suggests adopting research method and agenda that give more space to in-depth conversations, not only dedicated to coordination in the project management but, more importantly, to *share* knowledge, have time to confront viewpoints at each stage of the research project and work together to co-construct. It is therefore important to take care of the “*Ba*” [12] during the project.

Even if the analysis of our previous projects [5] did not deepen knowledge processes dynamics, objectives (*ex-ante*) for industry and research, and *outputs* for practice and academia, reveal a mix of *knowledge* (viewed a resource, an object) and *knowing* as part of action, with (from our perspective) a twofold level of “action”. Action refers to: 1) logistics and SC management and 2) collaborative research project management; both being of value for partners. Further projects should therefore *explicitly* ambition to develop both knowledges *about* and *for* both levels of action.

This is even more so important that at each stage of any project, there are from both partners demands for knowledge *transfer* and moments when there is intensive knowledge *sharing*. Their relationships with knowledge generation and creation being difficult to track back. To better understand the dynamic between knowledge processes further research projects should *keep traces* of exchanges and productions of knowledge.

These results suggest adopting the guidelines presented in [5] and deepening the study adopting *in vivo* research to better understand the dynamic of knowledge processes in joint industry-academia research projects aiming at creating knowledge. When launching new joint industry-academia research projects from the early 2018, we chose action research as the main research approach.

3.2 Action research to conduct joint industry-academia research projects

“Action research is an orientation to knowledge creation that arises in a context of practice and requires researchers to work *with* practitioners” [21]. Action research aims at contributing *both* to practical concerns *and* creating scientifically acceptable knowledge through the development of mutually productive forms of collaboration between research and practice.

3.2.1 Different action research approaches

Under the umbrella of action research there are many ways of conducting research projects, of organizing interactions between scholars and practitioners, and of defining their respective roles. Different approaches are promoted such as collaborative management research, interactive research, action learning research, participatory action research, or action research for transformation (ART).

In management sciences, action research approaches emphasize knowledge creation through some form of *co-operation* between researchers and practitioners where research is conducted *jointly* by the researchers and the practitioners during the entire research process, from formulation of the initial problem to dissemination of results [21, 22]. In action research, knowledge is assessed by its practical consequences and not only by its explanatory power.

Interactive research [23–26] explicitly includes an educative ambition, called “the third task” in [23]. Interactive research “focusses on creating opportunities for researchers and practitioners to engage in joint learning and knowledge creation” [25]. It is therefore about research, development, and learning. The educational task aims at enhancing the competences of the parties (practitioners, scholars, and students) involved in the research project through dialogue, co-working, and learning. In interactive research, knowledge creation results from the interactions of two cyclical systems [23–26]: the research system and the practice system. These two activity systems may be seen as two interlocked, collective, and interactive *learning cycles* that produce successive versions of *common conceptualizations* of the research object and *common understanding* of the ongoing change process that could be viewed as significant both from the perspective of practice and from the perspective of research [23, 25]. Interactive research insists on the distinction between “on-stage-performance” at the workplace and “back-stage-reflections” [23, 25].

Action learning research [27] focuses on knowledge *in action* and considers that there is no learning without action and no action without learning. “It does not impose expert knowledge but, rather, creates collaborative environments where research experts and local stakeholders share and work with different kinds of knowledge and share the resulting intellectual property”. Therefore, action learning research insists on the *direct experience* of solving problems and demands *reflective* practice. In action learning research, researchers and managers are connected to the “real” world and problems, immersed in the setting, are actor and agent of change and create knowledge through *cycles of action and reflection*. Action learning research “involves the theoretical positioning and analysis of the action, using appropriate theoretical perspectives and frames with a view to identifying emergent theory and contributing to actionable knowledge” [27]. “Participants are in a group and committed to action and learning and to the generation of actionable knowledge. They are facilitated in meeting *on equal terms* to discuss and report on progress. Integral to this method is an awareness of self, of one’s companions and of the external world” [27].

Participatory action research [22] and *action research for transformation* (ART) [28] aim at solving complex societal problems including the people. They broaden

repertoires of learning to produce more *inclusive knowledge forms* and works with people in a way that they become active. They help stakeholders to learn while addressing the challenges they care about. ART is critically engaged “with the production of knowledge for sustainability through more action-oriented transformations research”: co-producing a better world for all. It privileges *experiential learning* with reflection on action for desired futures. Thus, by engaging and empowering people, ART “can direct the inexhaustible resource of human creativity at all levels – individuals to society – toward addressing our global problems” [28]. For the researchers, “transformational work requires intimate engagement and self-awareness, which brings the whole person to the work; it is not just about changing something ‘out there’, but it is also about both changing ourselves and our mental models, and our relationships between the out there and the in here” [28].

The above types of action research show different stakeholders involved in the projects as well as varying degrees of engagement and of willingness to empower them and to transform organizations and society. Even if “action research *with* partitioners *always includes* partitioners as partners in the work of knowledge creation”, every project is happening along a spectrum [21]. On one end there is “as minimum as necessary” consultations between partners, on the other end partners are “co-researchers” who co-design the work and may take it in new directions [21, 22]. The spectrum not only concerns generating knowledge but also educating people, empowering stakeholders, and transforming organizations and society.

3.2.2 Action research commonality

Despite the variety of research forms within the class of action research approaches, some common features can be highlighted: action research privileges *praxis* and pragmatism, includes experiential learning, calls for reflection on action, brings “intelligent collaboration directly into knowledge creation processes” [28]. It leads academic researchers to dialogue with practitioners (and even people) and, to a certain extent, to co-produce action *and* research, knowledge creation being *a mean and an end*.

Because “the scientific value of action and collaborative research is still a matter of debate within the social science research community” [23], the quality of action research is a hot topic. For [27], quality in action learning research relies in 1) Action learning research engagement with real-life issues, 2) The collaborative nature of action learning research, 3) The reflective character of action learning research, 4) Workable outcomes and actionable knowledge. More generally, in [21], quality in action research 1) proceeds from a *praxis* of participation, 2) is guided by practitioners’ concerns for practicality, 3) is inclusive of stakeholders’ ways of knowing, 4) and helps to build capacity for ongoing change efforts. Seven criteria can be used to assess quality of an action research project/paper [21]: articulation of objectives, partnership and participation, contribution to action research theory/practice, methods, and process, actionability, reflexivity, significance.

Action research is challenging, and many academics experience difficulties related to the conflicting logics behind this type of collaborating research. Some facilitatory points are frequently mentioned. Early dialogue and negotiation between the parties involved in the research process is useful to express the different expectations on the planned research process. In the joint definition phase, a written initial agreement can help clarifying partners roles and ambitions vis-à-vis research, practice, and society. It seems necessary to respect and preserve the differences between the “spheres” of research and practice [23]. The quality of the “relational space” is important [28] and it is necessary to use research tactics and methods creating an interplay between research-oriented and practice-oriented activities

over time [22], (e.g., join seminars [23]). It is also necessary to make distinction and alternate between performing “on-stage” and engaging in critical analysis and reflection “back-stage” [23, 25]. To facilitate this learning loop, it is importance to produce intermediary documents to share and disseminate knowledge [28]. To favor reflexivity, the disciplined use of field notes, journal keeping, and formal documentation are critical for capturing the dynamics of the reflective process [27]. To make it possible to build common understanding and take intelligent action, the “conceptual space” is critical [28]. Importantly, there is no valuable knowledge creation from a scientific point of view without robust research methods [21].

From this respect, action research is an approach toward designing the whole research process consistent with the use of different types of research methods [25]. Bradbury et al. [21, 25, 27] list many possible qualitative and quantitative methods that can be included and combined in an action research design.

This synthesis of action research clearly shows that this approach seeks knowledge creation thanks to a dialogue between theory and practice and favors industry-academia interactions and co-construction. It is therefore a relevant approach to foster industry-academia knowledge processes in joint research projects and to deepen the study of knowledge transfer, sharing and generation and of their interactions. However, despite the clear focus of action research on knowledge creation, very few studies are focused of the knowledge processes dynamic in such research projects. Our research intents to fill this gap.

4. Results from two action research in joint industry-academia research projects

Sub-Section 4.1. specifies the context and the methodological choices made to conduct the two action research projects analyzed in this chapter. Sub-Section 4.2 presents the projects and reports the knowledge processes at work. Combining projects analysis, sub-Section 4.3 outlines a framework of knowledge creation dynamic unveiling knowledge processes interactions and identifies some important factors influencing it.

4.1 Context and methodological choices to conduct the research projects

Considering that action research is a “macro design” and that “an obvious challenge for interactive research is to clarify and strengthen its methodological basis” [25], it is important to explicit the context and the methodological choices for the two projects analyzed in this chapter. It is important to remind that the projects have a double objective: 1) undertaking collaborative projects that fit with our research program and with companies’ key strategic issues; 2) deepening our understanding of the knowledge processes dynamic leading to knowledge creation.

The company that gave us the opportunity to launch the two research projects is a global manufacturer with prior experience in joint industry-academia research projects. Since its product and service offerings rely on international supply chains, the company is more and more dependent on multi-tiers networks of suppliers and retailers and the quality of the supply chain (SC) execution is crucial. In this company, SCM is considered as a strategic dynamic capability to be developed to succeed in its volatile, uncertain, complex, and ambiguous (VUCA) business environment.

The company contacted us to develop an industry-academy partnership to benefit from the logistics and SCM knowledge of our research center and to boost

collaboratively R&D and research. For both projects, we gave a list of research topics aligned with our research program and considered as “gaps” in the academic literature. The company selected the topics fitting the best with its strategic priorities.

Since the beginning, the overall idea was to develop at least one collaborative research project including a 3-years PhD student participating in action and working under a co-supervision. As the academic supervisor, I was expected to be an active member of the research team, participating in the knowledge processes of the project. This was therefore an opportunity to build upon the guidelines from [5], to adopt action research, and to develop “generative learning” [13] to explore, extend and develop results from [5], especially to better understand knowledge processes dynamic leading to knowledge creation.

The collaboration began in early 2018 and the first project (P1) was officially launched in November 2018. The second project (P2) was discussed in early 2020 and was officially launched in October 2020. P1 and P2 have a similar ambition (share and generate knowledge, improve SC performance, develop competences and capabilities) but there are differences in terms of topic, conceptual basis, SC scope, research planning and supervisor in the company (both being logistics and SCM managers with expertise and seniority in the industry and the company).

In both projects, the industry-academia dialogue began at an early stage to refine the research topic, co-construct the project, and clarify the objectives for practice and research. In both projects, a formal 3-years contract agreement (aligned with PhD requirements) has been negotiated, each planning being in three main phases.

At the very beginning of every project, me and the PhD student opened a “research diary” [29] to report on the research process (project traceability). The diary and the research documentation and data produced all along the project are used to develop, in parallel of each project, a meta-level analysis thanks to reflective and reflexive inquiry [21, 27, 30, 31]. Reflexivity mixed with “contemplative activities” [32], in turn, leads me to write a lot of reflective notes about industry-academia interactions, dialogue and co-construction as well as knowledge processes and dynamic in these projects, pointing out problems, questions, ideas, and even emotional reactions. The lessons learned during the beginning of P1 (2018–2019) were reused in P2, and from the moment when the projects overlapped (2020), there are learning interactions between the projects that are not independent.

The action research (AR) choices for both projects combine aspects from the approaches presented in subsection 3.2. The research and practice spheres [23–26] were clearly identified, and partners agree their identity must be preserved (interactive AR), but a collaborative action learning [27] sphere was considered necessary to have more day-to-day dialogue and co-construction (action learning research). The educational task [23] (interactive AR) linked to the participation of a PhD student in each project was crucial to create this collaborative sphere. In P1, the PhD student mainly works in the company and devotes 70% of time in action, in P2, the PhD student mainly works in the research center and devotes 50% of time in action.

Compared to existing literature in supply chain knowledge management research, our methodological choices fill a gap. As stated in [33]: “the low occurrence of the face-to-face mode identifies a significant literature gap for a qualitative topic such as knowledge management in the supply chain”. More generally, it fills this gap in the broader logistics and SCM literature that, in the search for more scientific rigor, seems to have “lost its connection with practice” [34].

The overall analysis of the projects, separately and combined, uses the conceptual basis in the highlight boxes in subsections 2.2 and 2.3.

4.2 Knowledge processes and their relationships in P1 and P2

This subsection presents the two action-research joint industry-academia research projects with clear knowledge creation objectives in logistics and SCM. We adopt a narrative form to report industry-academia knowledge processes at work. From the data and in line with the choices made in Section 2, we identified: knowledge transfers from academics to partitioners (coded Ta), knowledge transfers from partitioners to academics (Ti), interactive knowledge sharing (S), research knowledge generation (Gr) – with reference to theory and elaborated during “back-stage-reflections” –, practice knowledge generation (Gp) – related to “on-stage-performance” at the workplace –, and knowledge generation combining both (Gr + p). It is important to note that in action research [21–28] both academics and partitioners can participate to Gr, Gp and Gr + p. Among the many interactions and knowledge processes episodes, we focused on patterns ending with knowledge creation with value for partners and being attested by some “production” (P) (some being public academic publications – work-in-progress papers, conference papers, articles –, others being for internal use in the company and in formats that best suit knowledge transfer and dissemination (in line with ART [28])).

Lessons from P1.

For P1, the overall question is how to improve tracking and tracing systems to develop SC visibility and to create more value to SC stakeholders, the SC scope being the downstream SC. In the beginning of P1, the company clearly wanted to benefit from our 20-years research experience on traceability and tracking/tracing systems. The first knowledge process was (Ta) with a conference about “total traceability”, given in the company, starting-up the industry-academia dialogue. The project has been discussed, designed, and written on this prior academic conceptual basis and many knowledge exchanges (Ta + Ti) during the negotiating and contracting period.

In P1, knowledge sharing (S) quickly began “on-stage” with the participation of the PhD student in many R&D projects focused on track and trace issues (diagnosis of existing systems, usefulness of available new technologies, changes in systems and/or in the logistics operations, etc.) and triadic supervision meetings. The first PhD-year included intensive professional and academic learning. (S) about R&D projects raised a question: “why improving track and trace systems?”. The answer was vague: “to have visibility”. A sequence of knowledge transfer (Ta + Ti) + (S) led to 3 research works based on qualitative methods.

The first one explored SC maps and SC mapping activities in the company to specify SC visibility needs. Academics asked for Ti and collected data with reflexive interviews with practitioners (Gp). Data analysis (Gr) produced intermediary (P) with restitution (Ta). The results – with “surprises” – were discussed during a focus group with (S) that led to (Gr + p) and (P). The unexpected results of this work led to another “back-stage” pure theoretical reflection by academics (Gr) with (P).

The objective of the second research was to deepened knowledge about the concept of SC visibility. A literature review (Gr) combined with individual reflexive thinking from the experience of people in the company (Gp + Ti) led to analysis (Gr) and (P). (Ta) of the results had important consequence for action (Gp). It reveals SC visibility as the core co-constructed “conceptual space” of the research.

The third work complemented the conceptual space with a synthesis (Gr) of the concept of value with (P). Discussions with (S) led to (Gp + r). The overall analysis for the PhD, linking track and trace, SC visibility and value, is in progress (P1 finished end of 2021 and the PhD is to be defended in 2022).

Lessons from P2.

P2, which scope is the end-to-end SC, questions the relevance of improving both SC robustness and resilience to face risk, uncertainties, and crisis and how to do

so. The topic was proposed by academics just before the beginning of the covid-19 pandemic. It has been quickly accepted considering the need for both partners to learn from this special crisis. P2 project was mainly based on an academic literature review (Gr) with (P). A kick-off industry-academia meeting launched the project: conceptual basis for the research has been proposed (Ta) and interactive questions and answers resulted in (S). Discussions show the need to stabilize a common conceptual basis to favor dialogue and co-construction of “useful” knowledge.

The pandemic context (covid “waves”) put pressure on practitioners and researchers and imposed the agenda and method for the first data collection. Qualitative interviews were the opportunity to (S) about the concepts and to foster (Ti + Gp) to collect experience of covid first wave. Back-stage analysis by academics (Gr) produced intermediary (P). Another industry-academia meeting with intensive co-preparation with (S), mixed (Ta + Ti + S + Gr + p), leading to refined results (P).

Because of the pandemic, it had been difficult up-to-now to develop the interactions in the practice sphere with the PhD student. However, the research and practice spheres could benefit from frequent online meeting with (S) leading to (Ta + Ti) but could not end yet with (Gr + p). However, the PhD student could participate in crisis working groups which is a first step toward more engaged and collaborative action research.

4.3 Combined lessons from the two projects

4.3.1 Knowledge creation dynamic: about KM processes and role of action research

The analysis of P1 and P2 confirms there are different knowledge processes at work that combine and end with knowledge creation (**Figure 1a**). It is valuable to distinguish transfer from sharing and generation from creation (the result). Iterative transfers (Ta + Ti) are very different from sharing (S) in an interactional practice and/or research space.

(Ta) was the first knowledge process at work in the two projects, clearly expected by the company. It was necessary to trigger the research process and stimulated others knowledge processes.

Figure 1. Knowledge creation dynamic. *a.* Knowledge processes interplay. *b.* Knowledge generation variety. T (knowledge transfer): collaborative research leads to a T dynamic (succession of exchanges Ta, Ti and Ta + Ti). T->S (knowledge sharing): T calls for conversation, dialog, turning into S. S: co-working in action and/or research leads to a S dynamic. S->T: S stimulates T (one-to-one or to-many – dissemination). T->G (knowledge generation): T (specifically Ti collected by academics or Ta) provides basis for G (especially Ti->Gr; Ta->Gp). S->G: S (specially by I + A in the P + R sphere – see **Figure 1b**) stimulates G. S->G leads to more “surprises” than T->G. G: action research leads to a G dynamic combining three G spheres and G actors (**Figure 1b**) ending with Gp, Gr, Gp + r, the later leading to the greatest “surprises” in terms of C (knowledge creation). G->T: in action research there is a systematic T of any G (communication, dissemination). G->S: G sometimes demands discussion, dialog to deepen reflection.

The overall analysis of knowledge processes sequences in P1 and P2 leading to knowledge creation (with P) unveils the interplay between knowledge processes. **Figure 1** outlines a framework of knowledge creation dynamic.

The results not only deepen KM studies but also AR studies. Our research refines the analysis of research and practice spheres interplaying [30–33].

Compared to previous projects [5], the action research approach proved to boost knowledge creation thanks to industry-academia co-working *in action* (in our cases for the PhD student) and *in research*. Knowledge creation benefits from the combination of *knowledge* and *knowing* [19, 20], and from a more balanced industry-academia relationship [27]: knowledge of academics or practitioners, as well as knowledge generated in the research and/or action sphere are equally valuable, and benefit from being blended. Nevertheless, action research confirms to be time-consuming (academics and managers need time to get used to each other, learning takes time, knowledge creation dynamic is time-costing) with important methodological challenges.

4.3.2 Facilitators, barriers to KM processes and their dynamic

The *in vivo* test of guidelines adopted from [5] and of action research confirms they can be considered as valuable in the context joint industry-academy research projects. Even if our objective was not focused on facilitators and barriers, during our reflective and reflexive analysis we identified factors worth noting.

The role of the SC expert leader and industry supervisors reveals very important, especially their support since the beginning and all along the projects, and the animation with the rest of the company (promoting the project, boosting participation of people in the projects, fostering intra-organizational interactions, and contributing to expand knowledge transfer, sharing and generation in the company and SC partners).

Prior experience of partners in joint industry-academia research projects is another important point as well as their learning orientation and culture, including experiential learning [28], with cognitive (noticing, pay attention), affective (feeling, be astonished) and behavioral (acting, tell about it) capabilities [32]. Their efforts to learn from experience and draw progress upon it had a direct impact: experience during P1 clearly served P2 (especially concerning the care to build the conceptual and relational spaces of the project).

The overall context of the projects plays a key role. It can boost the willingness to create knowledge (example in P2), or constraints interactions, dialogue, and co-construction and knowledge processes (example the covid pandemic for P1 and P2).

Because the PhD student is a cornerstone of such projects with impact on the knowledge processes dynamic, the relationships between the co-supervisors and the frequency of the triadic interactions (PhD student and co-supervisors) are crucial. They impact the research process and the PhD student learning process.

The PhD student's vision of its role in the process is also very important. With regards to the participatory nature of the projects, the question of how he/she sees its knowledge power has a strong influence on (Ti), (S), and (Gr + p).

The conceptual space is a key resource in such projects [29]. Without a common and clear conceptual basis, it is difficult to dialogue and co-produce knowledge. The co-construction of the conceptual space is a key issue that, in P1 and P2, benefited from a rich state-of-the art from academics (Gr + Ta + S).

The projects confirmed the importance of the interactional space and “Ba” for dialogue and co-construction. There are key enabling persons, tactics (example industry-academia meetings), or methods (example focus groups) that stimulate,

develop, and maintain their quality. The covid pandemic showed the sensitiveness of this space and the need to maintain it. Remote online meeting using video conferencing systems changed the interactions, but the frequency of industry-academia exchanges increased, and the audience could be developed (example in P2 industry-academic meetings), stimulating Ta + Ti + S (example sharing papers, news, data that would not have been shared in “normal” circumstances).

In both projects, the knowledge processes dynamic is undoubtedly stimulated by intermediary productions all along the project process, whatever their form, audience, and degree of achievement.

In such projects, the knowledge creation needs to alternate on-stage/back-stage [23, 25] work and give time to be reflective and reflexive [21]. The “iterative cycle of action and reflection” [27] by academic and/or practitioners is core to the dynamic.

Such projects demand to be able to mobilize – sometimes in an opportunistic way – a wide range of methods or tactics to adapt to an ever-changing context.

5. Conclusion

This chapter combines our experience in running joint industry-academia research projects in the domain of logistics and SCM, a review of the KM literature focused on knowledge processes, an analysis of action research approaches, and the reflective/reflexive experience from two ongoing action research joint industry-academia research projects with a company. Considering the contexts of the two projects, action research appears like an adequate way of producing knowledge in volatile, uncertain, complex, and ambiguous (VUCA) contexts, to address global challenges.

The research has several theoretical contributions and managerial implications. It provides a rigorous conceptual basis to study four distinct KM processes: knowledge creation, generation, sharing and transfer. The in-depth analysis of the dynamic of knowledge creation confirms the complementary nature of these KM processes and gives insights about the interactions/relationships between them. This confirms the importance of adopting a holistic perspective, not reduced to a unique KM process, and the relevance of articulating/bridging different knowledge views. From a methodological point of view, the micro-KM processes identified and used to code knowledge creation episodes (Ta, Ti, S, Gr, Gp, Gr + p) can be reused in another research. The framework proposed in **Figure 1** is an important grid of reading for academic and practitioners. It reveals the knowledge creation dynamic at a micro-level: the interplay of KM processes as well as of industry and academia actors, the interlocked nature of research and practice spheres. The research also confirms the value of action research as a class of research approaches for joint industry-academia projects but highlight some challenging points. It stresses how important are: the conceptual and interactional spaces, the robustness of research methods, the discussion about intermediary productions, and the efforts of key persons to maintain the interplay of actors, even if it is time-consuming. The research also suggests taking care of the iterative on-stage/back-stage work necessary to articulate action and reflection to create knowledge.

The results presented in this chapter not only complement KM studies, deepening the study of knowledge processes and of their interactions, but also action research studies, combining different approaches and reporting from *in vivo* experiences. It also bridges KM and AR studies showing that action research boost knowledge creation in joint industry-academia research projects.

Beyond the understanding of knowledge processes in joint industry-academia research projects, the results suggest another issue. The KM literature as well as the

logistics and SCM literature stress the difference between doing activities because you have to and doing them *consciously to create value*. In line with [8] which “defines firm’s KM practices as the conscious organizational and managerial practices intended to achieve organizational goals through efficient and effective management of the firm’s knowledge resources”, an overall question can be raised: could/should knowledge processes be consciously managed in joint industry-academia research projects? Could/should these projects explicitly include a *deliberate* KM strategy? Would a conscious approach of KM foster knowledge processes and their dynamic? Since joint industry-academia research projects make part of the partners’ knowledge strategy – although more implicitly than explicitly – another question could be raised. Should joint industry-academia research project be *consciously* considered by research partners as making part of their KM strategy?

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Conflict of interest

No conflict of interest.

Author details

Nathalie Fabbe-Costes

Aix Marseille Univ, CRET-LOG, Aix-en-Provence, France

*Address all correspondence to: nathalie.fabbe-costes@univ-amu.fr

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