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Knowledge creation in projects: an interactive research approach for deeper business insight

Annika Engström, Anette Johansson, Nina Edh Mirzaei and Kristina Sollander
Department of Supply Chain and Operations Management, School of Engineering, Jönköping University, Jönköping, Sweden, and
Daved Barry
Clarkson University, Potsdam, New York, USA

Abstract

Purpose – The purpose of this paper is to shed light on different types of knowledge created and how this links to the project design, process, and content.

Design/methodology/approach – In this paper the authors investigate participants' experiences from a three-year interactive research project, designed to trigger reflection among the participants. They apply a knowledge creation perspective on experiences expressed by participants as a result of different research project activities.

Findings – The study resulted in five categories of insights with potential for sustainable influence on the participating organizations: an understanding of concepts and theories; an understanding of the impacts of collaborative, reflective work processes; an understanding of the meaning of one's own organizational context; an understanding of the importance of increased organizational self-awareness; and an understanding of the potential for human interaction and communication.

Practical implications – The author's findings suggest that it is possible to design a project to promote more profound and sustainable effects on a business beyond the explicit purpose of the project. They advise practitioners to make room for iterative reflection; be mindful to create a trustful and open environment in the team; challenge results with opposing views and theories; and make room for sharing experiences and giving feedback.

Originality/value – This study contributes to unraveling key practices which can nurture conditions for knowledge creation in interactive research projects and business projects alike.

Keywords Practice-based research, Collaborative research, Knowledge creation, Qualitative research, Project management

Paper type Research paper

1. Introduction

The project form dominates work in large parts of our society, and the term "projectification" is used to explain developments toward the creation of a project society (Lundin *et al.*, 2017). Projects are seen as efficient ways of organizing people with different areas of expertise to work on a joint task toward common goals, often in contexts that demand collaboration between different competencies, functions, and departments (Canonico *et al.*, 2013). This is

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typically the type of context involved in complex product and process development, which has contributed to the view of project-based organizations as key sites for knowledge creation and innovation (Davies and Hobday, 2005). Projects are also often seen as learning spaces (Nilsen, 2013) and used as learning mechanisms (Scarborough *et al.*, 2004). Understanding how knowledge in projects is created, communicated, and shared in organizations is critical to both project management research and practice, given the strong influence of projects on society.

One arena where knowledge creation is at the very core is academic research projects. Plenty of evidence shows that projects within academic research using interactive, action-oriented, collaborative research forms—thus sharing similarities with typical business context projects—have positive impacts on learning (Svejvig *et al.*, 2021). Nevertheless, despite the potential this research approach has for addressing complex organizational problems (Avison *et al.*, 2018) by combining theoretical rigor and practical insights (Geraldi and Söderlund, 2018), it has received little attention in the project research community (Svejvig *et al.*, 2021).

The co-production of knowledge in research projects (Lindhult and Axelsson, 2021) is a strong tradition in Scandinavian management research (Gunnarsson *et al.*, 2015), as well as an important part of the sustainable Swedish model for innovation, renewal, and effectiveness in the industry (Magnusson and Ottosson, 2012). In the family of co-productive research approaches (CARs) (Lindhult and Axelsson, 2021), interactive research is developed from action research traditions (Aagard-Nielsen and Svensson, 2006). Actions and changes in behaviors and mindsets are the focus, and shared experiences in joint learning through different phases in the research process are central (Svensson *et al.*, 2002, 2007). Interactive research differs from action research in that researchers (the academic system) and practitioners (the practice system) have an equal relationship with and impact on the knowledge created. At the same time, the roles and responsibilities connected with knowledge creation in the respective systems are clearly defined – researchers are responsible for knowledge creation in the academic system, whereas practitioners are responsible for knowledge creation in the practice system (Aagard Nielsen and Svensson, 2006; Cronholm and Goldkuhl, 2003).

Interactive research approaches have recently been evaluated and described as powerful in terms of validity for meeting organizational and societal needs and for reaching rigorous research results (Ellström *et al.*, 2020; Wallo, 2008; Wallo *et al.*, 2012; Andersson *et al.*, 2022). However, despite the seemingly common agreement among researchers that interactive research has an impact on learning, research in this context still lacks empirical descriptions and examples of cases and research project designs of this kind (Lindhult and Axelsson, 2021). Interactive research is often designed as projects that include analytic seminars between scholars and practitioners (Ellström *et al.*, 2020), feedback dialogue meetings with companies, and workshops that include researchers and practitioners (Svensson *et al.*, 2002, 2007). There is little understanding of how different types of activities, such as reflective conversations, meetings, and workshops, lead to various kinds of knowledge creation (Lindhult and Axelsson, 2021). Additionally, the increasing demand for academia to collaborate with and contribute to society and the attention to the impact of publications rather than their quantity make robust models important for achieving sustainable effects in interactive, collaborative research projects (Lindhult and Axelsson, 2021; Svejvig *et al.*, 2021).

In this paper, we investigate the experiences from a three-year interactive research project with small and medium-sized manufacturing companies in Sweden focusing on innovation capabilities in terms of organizational ambidexterity (Junni *et al.*, 2013; Lubatkin *et al.*, 2006; O'Reilly and Tushman, 2008; Zimmermann *et al.*, 2015)—the ability to simultaneously exploit existing and explore new knowledge (March, 1991). The purpose is

to shed light on the different types of knowledge created during the project and how that links to the project design, process, and content. We apply a knowledge creation perspective (Ellström, 2001, 2010b, 2011) to the experiences that the participants expressed as a result of different activities in the project. In doing so, we respond to the challenges raised relating to understanding how knowledge in interactive projects is created and how it is linked to specific activities. Therefore, we contribute to unraveling key practices which can nurture conditions for knowledge creation in both interactive research projects and business projects.

2. The theoretical framework

The theoretical focus of this paper is knowledge creation processes in interactive projects in general, and in interactive research projects particularly. We refer to knowledge creation as an action-oriented learning process and highlight reflection as an influential mechanism.

2.1 Knowledge creation processes in interactive projects

Projects are often viewed upon as learning spaces (Nilsen, 2013) and used as learning mechanisms (Scarborough *et al.*, 2004), and there is ample evidence that promoting interaction and collaboration are key ingredients in knowledge creation in projects. For example, a study on quality improvement projects by Choo *et al.* (2007) defines learning behavior as interaction between members and that adhering to a specific method (in this specific case problem-solving steps in the Six Sigma framework) influenced this interaction and subsequently created knowledge. Other examples include the study by Faccin and Balestrin (2018) who identified collaborative practices in R&D projects to be key to ensure complementary exploration and exploitation approaches necessary for both innovation and knowledge creation, and Weck's (2006) study on interfirm R&D projects which concluded that the exchange of complementary specialist knowledge were key success factors in the process of interfirm knowledge creation.

Moving over to knowledge creation processes in interactive research projects, there are a number of factors frequently mentioned as being important. In interactive research, researchers need to be capable of linking the research content and process to the context (Pettigrew, 1990) to question how and why things work as they do and to support change. Aspects such as trust and equality are essential components of the process (Gunnarsson *et al.*, 2015), to avoid misunderstandings, actively promote participation, overcome practitioners' resistance, work for a common perception of the problem, and be aware of tensions that emerged. As Westlander (2008) notes, researchers need to take responsibility for leading the knowledge creation process and initiate meetings/interactions with the actors in the practice system. Along these lines, Johannisson *et al.* (2008) notes:

> To combine equal relationships and critical thinking, to balance closeness with critical distance, to be proactive without being controlling (the process is owned by the participants), to start from the specific and local but to strive for general explanations, to have knowledge without being an authority, to be able to adapt and improvise while preserving integrity and independence, to be able to combine theory and practice, to be able to act as trailblazers, to think strategically but at the same time respecting ethical considerations, which requires practical wisdom—phronesis—to be part of the development process without being held ransom by it, and to have good knowledge of [the researcher's] own discipline but at the same time aim for an interdisciplinary understanding. (Johannisson *et al.*, 2008, p. 371, author's translation)

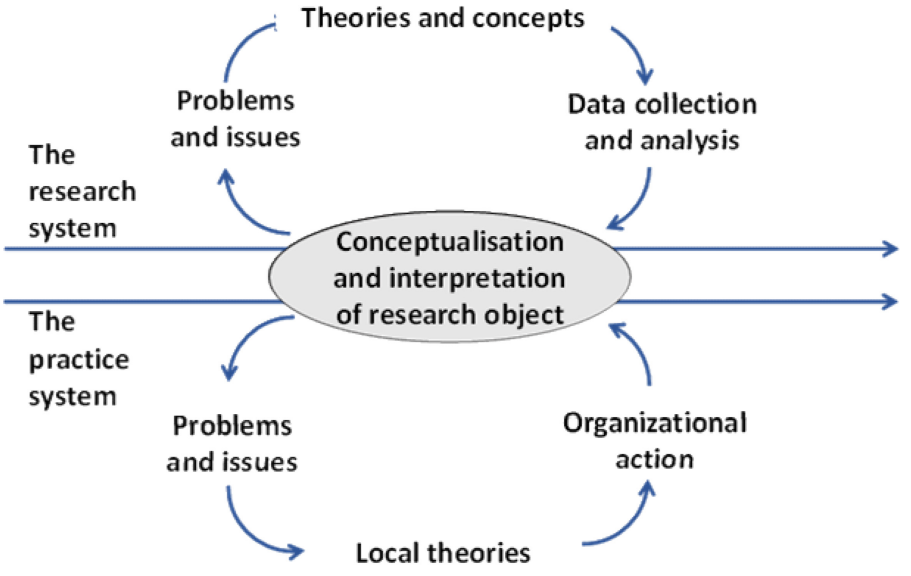
Face-to-face meetings in person are common in knowledge creation processes in collaborative research projects (Palm, 2007). Workshops of different kinds have become common ways of carrying out project meetings, even though they have various names, such as dialogue conferences (Gustavsen and Engelstad, 1986), interpretive forums (Mohrman *et al.*, 2001), cooperative inquiries (Heron and Reason, 2006), seminars (Svensson *et al.*, 2007), meetings or group meetings (Larsson, 2006), jam sessions (Börjesson and Fredberg, 2004), and feedback sessions (Ellström, 2007). Furthermore, these workshops can play different roles in a project. Their goals can be trust building and networking (van de Ven, 2007), knowledge development (Adler *et al.*, 2004), knowledge creation (Jacob *et al.*, 2000), knowledge sharing (Näslund *et al.*, 2010), joint learning (Larsson, 2006), data analysis or interpretation (Mohrman *et al.*, 2001; Ellström, 2007), or testing and validation of results (Ellram and Tate, 2015).

Knowledge creation in interactive research projects depends on a democratic dialogue characterized by reflection and critical joint analysis, in which equally recognized knowledge interests in research and practice have the potential to complement and support each other, yielding more sustainable results (Aagard Nielsen and Svensson, 2006). The role of the participants needs to be negotiated and renegotiated in a process characterized by critical reflection, as position shifts in relation to the phenomenon being studied may be needed (Sandberg and Wallo, 2013). As highlighted in Figure 1, research in an interactive approach is responsible for academic knowledge development in the research system, whereas more context-specific knowledge is developed in the practice system. Both are equally important for different purposes.

The overlap between the systems, indicated in the center of Figure 1, illustrates the joint activities in co-production, whereas the arrowed loops show that the roles and the desirable output are different for the two systems (Svensson *et al.*, 2015).

2.2 Action-oriented perspectives on knowledge creation

There is no consensus on what knowledge creation really is (Runsten and Werr, 2016). Rather, there are many different definitions of knowledge in relation to different philosophical points



Source(s): Svensson *et al.* (2015)

Figure 1. Illustration of joint activities, between the two systems involved, in interactive research

of view depending on how one sees science (Chalmers, 2013). Knowledge in the *cognitive, rational perspective* (Winn and Snyder, 2004) is defined as objective information, facts, or methods, which are separated from both situations and actions (Runsten and Werr, 2016). This perspective on knowledge is common in technically oriented action projects focusing on the development of products, processes, or artifacts in co-creation with partners from industry (Hevner *et al.*, 2004; Susman and Evered, 1978; Wieringa and Morali, 2012). Knowledge in the *situational, contextual perspective* (Lave and Wenger, 1991) is regarded as an activity in a social system (Engeström, 1987), in which the individual's ability and influence on the learning process is limited. This perspective on knowledge is common in social science-oriented projects, which focus on the critical analysis of conditions and agents in social systems (Engeström, 2008; Gustavsson, 2007).

An alternative to the above perspectives on knowledge is the *action-oriented perspective*, in which cognition and context are tightly bound (Ellström, 2001, 2010a, 2010b; Granberg and Ohlsson, 2005; Ohlsson, 1996). The individual's learning is seen neither as purely cognitive and rational nor completely dependent on the social system, without the ability to think rationally. In this action-oriented perspective (Schön, 1983), knowledge is considered an action—*knowing in action*—in which knowledge in relation to a problem, specific situation, context, or task is created. Knowledge creation here is defined as a learning process for change in mindsets, behaviors, and action patterns (Ellström, 1992). An action-oriented perspective draws upon Dewey's (2002) way of reasoning—we create knowledge while we are acting. When our habits or assumptions are disturbed, we act on impulse and gain experience. These experiences can, depending on the extent to which they reflect intellectually, create potential for knowledge creation, stimulate change in behavior, and lead to the development of new procedures in dealing with life (Dewey, 2002). This perspective is based on interaction, dialogue, and reflection (Döös and Wilhelmson, 2011; Ohlsson, 1996). When challenges are dealt within a social context, individuals in groups can jointly form and create an understanding of and insights into common action alternatives (Granberg and Ohlsson, 2005; Ohlsson, 1996). Ellström (2011) illustrates this by showing the tension between implicit and explicit action levels; tacit knowledge and routinized actions are based on habits, whereas awareness, transparency, and explicit work processes can increase knowledge- and reflection-based actions with a new and deeper understanding and insight.

There are different ways to categorize different types of knowledge or the content in learning processes. One way is inspired by anthropological emic and etic approaches (Chilcott and Barry, 2016). The emic approach investigates the knowledge of local people within the system and how they think, whereas the etic approach investigates knowledge in the system from an outside perspective. The members of a culture might be too involved in what they are doing to interpret their behavior impartially. Their assumptions can be seen as social representations (Moscovici, 1981), a mindset that is difficult to change. The etic approach functions as a perspective that a researcher or an outsider could have, which sometimes works as feedback or an eye opener for the people within the system. Another way to categorize different types of knowledge is inspired by the Greek *episteme* (Gustavsson, 1996, 2000), which means to understand how the world is structured and how it works; *techne*, which means to create and produce; and *fronesis*, which means to develop good judgment and to act as a democratic and ethical citizen. These different types of knowledge are closely related to one another and are formed in a dialectical process in which learning is based on what is already known, familiar, and recognizable in the encounter with the unknown. We experience the new based on how we interpret and understand the world. By doing and reflecting, we obtain insights into the larger context (Gustavsson, 1996, 2000).

2.3 Reflection in knowledge creation processes

An important factor in knowledge creation is learners' ability and willingness to go back and forth between the practical/concrete and the theoretical/abstract. Argyris and Schön (1978) call this *tension*—the differences between the theories in use *vis-a-vis* the espoused theories. Experiences per se do not automatically lead to learning. Developmental learning processes are dependent on reflection (Boud *et al.*, 2006; Dewey, 2002; Ellström, 2006; Wenestam and Lendahl Rosendahl, 2005), in which awareness of implicit and tacit knowledge is crucial (Ellström, 2010b). The reflection process includes both—something to reflect on and an awareness of one's own thinking. This means that attention is directed not only toward the experience itself but also toward the way of reflecting on it.

> A true reflection does not only mean that one has understood but also *how* the process of understanding occurred—when reflection leads to deeper knowledge. (Wenestam and Lendahl Rosendahl, 2005, pp. 82–83)

Wenestam and Lendahl Rosendahl (2005) conclude that reflection provides an opportunity to look at the situation from a distance and from a different perspective. To create this distance, people may need to engage in a dialogue with others. Schön (1983) describes these conditions in his study of professional development, in which reflection in direct problem solving and task performance is a driving force for developing professional attitudes. Conversations and reflection are tools that broaden perspectives, develop knowledge, and help practitioners not get caught up in models and methods that can stagnate and block thinking.

> Usually reflection on knowing-in-action goes together with reflection on the stuff at hand. There is some puzzling, or troubling, or interesting phenomenon with which the individual is trying to deal. As he tries to make sense of it, he also reflects on the understandings which have been implicit in his action, understandings which he surfaces, criticizes, restructures, and embodies in further action. (Schön, 1983, p. 50)

Even though knowledge creation seems necessary in organizational research, individuals and groups often prevent development and resist learning by engaging in defensive routines that avoid critical reflection (Argyris, 1994, 2010). This defense indicates both preparedness and resistance to change and can be seen as energy in learning processes (Illeris, 2007). Defensive behavior (Aagard Nielsen and Svensson, 2006; Adler *et al.*, 2004; Andersson *et al.*, 2022; Argyris, 1990, 2010) and learning difficulties have been discussed by Senge (1990). An excessive focus on daily activities and implementation based on what seems *right,* now, rather than development and sticking to long-term strategies, may be one of the reasons for both defensive behavior and learning difficulties. Another possible reason that Senge highlights concerns the overconfidence that we obtain from experience. Learning does not happen automatically, but it requires special arrangements and focus (Senge, 1990). It seems that humans, when most in need of learning, paradoxically hinder it even more (Argyris, 1990, 2010).

Actions such as defensive behaviors, or *theories in use*, must be made visible to break them and increase learning (Argyris, 2010). Actively dealing with discrepancies and disturbances stimulates learning (Engström, 2014), which is supported by a climate of psychological safety (Edmondson, 1999) and the ability to learn from failure (Edmondson, 2011). Robust learning includes three important components in relation to leading and analyzing learning activities: *steering*, *challenging,* and *supporting* knowledge creation processes (Svensson *et al.*, 2009). Steering toward the goal and with certain structures keeps the focus on the content of the learning process. Challenging includes not only disturbances, such as dealing with contradictions, discrepancies, questioning, and uncertainty, but also engagement out of one's comfort zone. Supporting includes active empathetic listening, responding, and

confirming someone's thoughts and opinions. Feedback can both challenge and support the learning process. Corrective feedback engages a person or group in dialogue to explore new ways of thinking or doing. Confirmatory feedback aims to support and strengthen a person's or group's pre-existing actions or knowledge (Egan, 2002).

3. Research methodology

To understand the different types of knowledge created in interactive research projects and how they are linked to the project design, process, and content, we studied how the participants in a three-year collaborative research project perceived the learning outcomes. We used a qualitative research approach, in which we focused on the participants' experiences of the project activities. In the following sections, we provide a detailed description of the context in which the study was conducted, the data collection, and the analysis of the participants' experiences.

3.1 Research case

The context of the study presented in this paper is a research project conducted in 2018–2020 in small and medium-sized manufacturing companies. The overall project goal was to strengthen innovation capabilities, in terms of organizational ambidexterity. The project was run by five researchers from different disciplines, and participants from six small and medium-sized manufacturing companies in Sweden. The design of the research project was characterized by an interactive research approach (Aagard Nielsen and Svensson, 2006; Ellström *et al.*, 2020; Svensson *et al.*, 2002, 2007). Snowball sampling was used to find collaborating companies before the project started. As Yin (2014) notes, this type of participant selection can be beneficial when seeking knowledge within specific areas. The sample-finding phase started from November 2017 to January 2018 and resulted in a group of six manufacturing small and medium-sized enterprises (SMEs). The companies were selected based on their history of working with operations improvements, their exemplary performance records, and their interest in enhancing their organizational ambidexterity capabilities. For these companies' information, please see Table 1.

Besides using an interactive research approach, the project adopted a problem-driven design and applied an emic approach with ethnographic roots (Chilcott and Barry, 2016), which means that "accounts, descriptions, and analyses expressed in terms of the conceptual schemes and categories regarded as meaningful . . . by the native members of the culture whose beliefs and behaviours are being studied" (Lett, 1990, p. 130) are central to the endeavor. Taking an emic approach in this study meant holding on loosely to the researchers' understandings of the organizations' ambidexterity and innovation capabilities while carefully attending to the participants' framings and practices, rather than using pre-existing operationalizations. During the research process, following Raisch and Birkinshaw (2008) and Czarniawska (2007), we collected multiple data from three mixed company focus groups, six company focus groups, 18 diaries, 257 survey respondents, and 25 days of shadowing and observations in the companies. Data collection was intertwined with data analysis in different stages and was later followed by feedback sessions with the companies and presentations of preliminary results in common workshops.

The project was planned in an iterative process with four-month cycles, which included the following steps during each cycle (Figure 2): (1) Meetings in a steering group consisting of representatives from each company and all researchers were held, in which previous work was processed and subsequent steps were planned, including the content of the next stages, companies' homework, the data collection needed, and the invitation of guest speakers. (2) Both academic and industrial partners collected data and experimented with new ways of working. (3) Analysis and reflection followed, in which academic and industrial partners met

	Argon	Bismuth	Fermium	Hydrogen	Lithium	Mercury
Number of employees (2017)	41	90	100	23	26	50
Yearly revenue (2017)	12,4 MEUR	21,5 MEUR	14 MEUR	5 MEUR	3,7 MEUR	7,3 MEUR
Ownership	Owned by current CEO	Private. Part of company group of 37 branches	Family business, 3rd generation	Private. Part of company group of 6 branches. Owned by family company group	Family business, 2nd generation	Family business, 1st generation. Part of company group of eight branches
Type of production	Customized plastic injection molding items	Customized turned metallic components	Parts or complete products for blower and fan solutions	Ventilation and fire protection	Customized high-pressure aluminum die casting items	Customized cutting assignments in aluminum, steel, stainless steel and plastics
Geographical markets	Sweden (international outreach via customers)	Global	Europe, Americas and Asia	Sweden	Sweden (international outreach via customers)	Sweden (international outreach via customers)
Customer industries (in order of turnover size)	Subcontractor to primarily the furniture and automotive industries	Subcontractor to the automotive, hydraulic and pump and motor industries	Subcontractor to the automotive and home electronics industries	The real estate and construction industry	Subcontractor to the automotive, disability aid, machinery, telecom, furniture and building industries	Subcontractor to the defense and medical technology industries

Table 1.
Participating companies

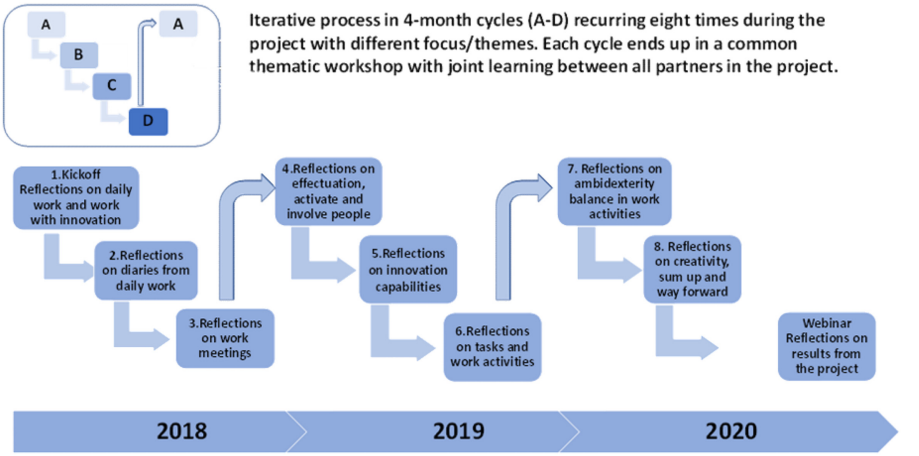


Figure 2.
The projects iterative process in four-month cycles

in their own arenas to discuss what was learned. (4) Joint workshops were then arranged, in which partner companies and all academics met to share knowledge and experiences. These workshops were what Ellström *et al.* (2020) define as analytic seminars; typically, 14–19 participants were present from the industrial partners and the research team.

The project was designed to stimulate reflection among the participants through both discussion and feedback. Reflection within each company was needed before each workshop to fulfill the assigned homework. An example of homework during the projects was reflecting upon their own diaries, which were recorded during one week. The reflections were conducted at both the individual and group levels. Furthermore, the participants reflected on work meetings that took place in their own organizations, and they investigated different work tasks and how they related to the phenomena we studied (ambidexterity). During each workshop, the participants presented their findings and discussed them with both the participants from other industrial partners and the research team. The industrial partners were encouraged to have more than one participant per company to ensure that the ideas, reflections, and insights gained during the workshop could be continuously discussed and worked with later within each company. Several companies started with one or two participants, but ended up with four or more participants toward the end of the project.

Each workshop was held during 24 h, from lunch-to-lunch, starting with a visit to the hosting industrial partner in the morning. Different workshop themes (Figure 2) were decided in the steering group, step by step, for each four-month cycle during the entire process. The workshops were often structured as follows: (1) joint lunch, (2) homework presentations, (3) mixed company group reflections on the presentations, (4) joint dinner, (5) theory input from a researcher or practical examples from a guest speaker, and (6) company-level group reflections on impressions from the workshop and the way forward.

3.2 Data collection—experiences from the project

This study is based on data collected in the form of oral testimonials and presentation materials on two separate occasions during the final phase of the research project: (1) the final workshop and (2) an open webinar. Both events provided meta-reflections on what the participants experienced during the project. This enabled an understanding of the link between the larger context of the interactive research project and its intended and unintended learning outcomes as perceived by the participants. The data consists of recordings and transcriptions of the final workshop and the webinar.

3.2.1 Accounts from the final workshop. The final workshop sought to address the learning outcomes from the project as understood from the perspective of each industrial partner. During the workshop, the participants' discussions took place in small groups, at the company level and in mixed constellations, and in a large group that included all project participants. Five companies were represented, and 19 people, all holding management positions, participated. During the workshop, the following questions were raised: (1) What areas within your organization have received the most innovation focus during the project? (2) Feel free to tell us more about your experiences with the changes you have tested and/or implemented. (3) When it comes to organizational ambidexterity, it is all about balancing the daily execution with the work around renewal in the business. What has facilitated and what has hindered the work on that balance? (4) What is the company's main challenge going forward? Each company presented their answers to the rest of the project team, followed by a joint discussion of thoughts and reflections. The presentation and joint discussion took between 45 and 60 min for each company and were recorded.

3.2.2 Accounts from the open webinar. The purpose of the concluding webinar was to function as an interactive platform for gathering the learning outcomes based on both the researchers' and the practitioners' perspectives and to disseminate the results of the project to a wider, primarily industrial, audience. The free online webinar on the difficult balance between stability and change in small and medium-sized manufacturing companies addressed the issue of working with both innovation and daily activities at the same time. It was a 1.5-h event divided into three parts: (1) a summary of the project background and purpose, (2) presentation of the findings, and (3) reflections by the research team and industrial partners on the findings. The participants representing the industrial partners were asked to prepare answers to three questions: (1) How has your view of innovation ability changed? (2) What exactly has happened in your organization? What focus in your business have you had during the project? (3) What advice do you want to give other companies based on the lessons you learned about innovation ability? One representative from each industrial partner held a presentation based on the above questions, and three selected participants took part in a panel discussion about the learning outcomes from the project. In total, 15 people, including the research team members, presented something at the webinar. The webinar was recorded and made available online afterward.

3.3 Data analysis

All the meetings were recorded and transcribed. Thematic analysis was carried out in two consecutive phases. In the first phase, NVivo software was used for the empirical analysis. The transcribed files were imported into the software, and all text was processed manually by the research team. All parts of the text indicating some sort of learning or change were highlighted and coded in different categories that simply described the content of that aspect (i.e. the first-order concepts). This procedure led to a combination of codes referring to company-specific aspects and very general ones. Once the transcribed files were fully covered, ensuring that no important aspects were left out, the second step of the empirical coding started. Here, the codes were clustered when deemed necessary (i.e. when there were overlaps in the aspects they covered). This was an iterative process that resulted in seven categories, which were the second-order themes: (1) interpretations and definitions of innovation; (2) the role of the project; (3) ownership and company size; (4) strategy, vision, and development; (5) self-image; (6) regional spirit; and (7) examples of changes. From these categories/themes, we managed to derive five aggregated dimensions (business insights) in a final empirical analysis inspired by Gioia *et al.* (2013), Aagard Nielsen and Svensson (2006), Adler *et al.* (2004).

In the second phase of analysis, the theoretical examination took place. The five aggregated dimensions were compared to the theoretical framework to understand the

outcomes of the project from a knowledge creation perspective and how such insights link to the design, process, and content of projects.

4. Findings

The empirical analysis of the data in NVivo resulted in five categories of insights derived from the participation in the interactive research project, with the potential for sustainable influence on the participating organizations: (1) an understanding of concepts and theories; (2) an understanding of the impacts of collaborative, reflective work processes; (3) an understanding of the meaning of the own organizational context; (4) an understanding of the importance of increased organizational self-awareness; and (5) an understanding of the potential for human interaction and communication.

4.1 Elaborating five categories of business insights

4.1.1 An understanding of concepts and theories. Throughout the research project, concepts and theories that are related to and that capture innovation and ambidexterity have been constantly addressed. The initial kick-off activity, in which representatives from the companies formed mixed focus groups, concentrated on how the individuals understood innovation, how they defined innovation work, and what made it different from their daily work.

When we wrapped up the project in the final session (the webinar), we could see that the company representatives had come a long way in terms of developing new insights into the definitions of innovation and how such definitions and the usage of concepts and theories supported them in their organizations' internal development. The following quote illustrates a reflection on the uncertain nature of innovation and the problems associated with it, emphasizing that planning is not easily done.

> . . . with innovation, you just don't know. / . . . / that's the whole thing with innovation; you don't have the methods or the time or the money—that is, you don't know how it's going to turn out / . . . / you're on thin ice; we don't know what choices we'll make. So, making plans is not easily done beforehand.

They also suggested that participating in the project had given them the feeling that working with innovation is "something bigger" that could "lift them," making them realize that they needed to include more people from the company taking part in the project.

Throughout the project, in the workshops, the research team shared the initial findings with the whole project group to validate and gain more insights. These moments of shared reflection sparked deeper insights. For example, a presentation of a shadowing study conducted on the participating managers showed surprisingly large portions of unplanned work throughout the workday. One of the participants told us how interesting it was to see the connections between unplanned work and innovation and how shameful unplanned work was to them before:

> . . . it's this that happens, which isn't planned, that's really interesting. That's when innovation happens or that's when you see new patterns or get ideas. This part of the unplanned is what I think is the most exciting./ . . . /Researcher A talked about not feeling ashamed about this; it's really part of being innovative or part of being in an organization, to be there for one another.

4.1.2 An understanding of the impacts of collaborative, reflective work processes. Throughout the research project, we applied an iterative, interactive approach. Among the reported learning outcomes, a pattern connected with having been part of the journey evolved. The participants talked about the inspiration they gained from the other companies and from trying new ideas and work methods. They also learned to understand and appreciate that other

companies encounter similar challenges, despite the different lines of business they are in and the manufacturing technology they apply.

> It's been exciting and interesting to have been part of such a big project; it's an inspiration to try new ideas and work methods to develop our business./ . . . /[what's] most rewarding has been to network with other companies and academics and to benchmark both the good and the bad, the negative and the positive experiences. And what you've seen in the project, really regardless of what we manufacture or what we do, is that we all face the same challenges.

As illustrated by the above quote, the network and the reflection that the workshops enabled seem to have been the key for the learning experience. Another quote explains this further and exemplifies that, together, the participants reached an understanding of the learning potential in seeing and reflecting on what others do:

> . . . to follow other companies for three years, to see their journey with the things they try, that makes us learn as well and see what we need to do next. It's an amazing opportunity to get to be close to other companies in this way and to follow them all. It's been very inspiring and rewarding, and we've received many tips and thoughts from the other companies, I think.

In one of the workshops, a manager from a company outside of the project shared some quite provocative thoughts on management. This company had grown fast and yet decided not to have any dedicated managers apart from its CEO. Collaboration, mutual trust, and feedback were brought forward as the company's key success factors. There was an intense and interesting discussion of these issues after the presentation was completed. One of the participating companies referred back to this session and stated that, after this session, the company started with quarterly based co-worker assessments to identify important issues and problems regarding the work situation. This, in turn, led to the closer involvement of manufacturing staff in project start-ups and in upcoming changes in the firm, which meant that problems and issues could be detected earlier. In other words, they learned that interacting and reflecting with more of their employees seemed to lead to better well-being and to better results in their operational work.

4.1.3 An understanding of the meaning of one's own organizational context. Throughout the project, the participants continuously brought up and emphasized the importance of their specific organizational contexts in their innovation capabilities and in the way in which these companies are managed. When they addressed their own contexts, the sizes of their companies (all of them are small to medium-sized companies), how they are owned and managed, the businesses they are in, the needs of their customers, and the region where they are located, it seems as if their ways of reasoning have expanded, and their appreciation and respect for their own specific contexts have developed.

At the beginning of the project, the participating companies had a quite modest view of their abilities and potential because they were small firms. In the end, however, when comparing themselves with larger organizations, they seemed to have learned to value their sense of belonging and their potential to build internally...they appreciated the advantages of being a small company.

> . . . the pride is considerably larger in such a company, and you have a holistic view and a holistic picture in a different way. In a large company, it's like, 'Our department does this,' but you don't know the bigger picture . . . [here] even if you work with the introduction process, you're fully aware what others do, what the company does and produces, and in what way. It builds on 'I'm an important part of the whole puzzle.'

Moreover, how the participants perceived and referred to their visions, strategies, and organizational development also improved. The longer the project progressed, the more the companies seemed to better understand their own organizations and contexts. One quote

illustrates the impact of the management team's participation in the project on the strategic development of the company:

> . . . a benefit we've seen too is the consensus in our management team. That we are all participating in the project meetings has given us strength. We know what vision we want to reach, and we form new goals and action plans to reach these new ideas, solutions, and everything that we've gotten from this project.

However, while the companies identified advantages with being small, they also acknowledged the difficulties that might be related to having few individuals involved in managerial tasks, for instance, in relation to the organization's strategy and ultimate purpose for existence:

> . . . as a small company, you think that everyone knows why; therefore, we don't really establish why we're here, but you think that everyone should know why we're here.

By identifying these challenges, they also came to realize how to use the project itself and its iterative process in order to further develop the management team. Statements suggest that the project was used as a platform or a space where they literally leave everyday work to reflect on their business:

> Where are we heading? How shall we work? The entire management team can benefit from answers to these questions. All of us need to be involved in this.

It seems as if the participants representing the owner-managed companies—to an even greater extent throughout the research project—started to analyze their own behaviors in relation to others and the implications this particular contextual aspect may have for the way they develop their organizations:

> . . . is it so that in owner-managed companies, SMEs, you're prepared to take certain risks; no super advanced calculations are being made. You're telling that you, as the owner, have stood for two and a half years and said, 'I support this. I know it will cost something; we don't have any calculations on it.' If you had known, maybe you would have said no, but now you're in it and then you just go for it. . . it's more based on emotions . . .. "I'm not fully aware (of the costs). I follow my gut feelings. Then I can have nightmares about it."

4.1.4 An understanding of the importance of increased organizational self-awareness. Related to the understanding of the importance that one's own context plays in innovation capabilities is the organizational self-awareness of the company's identity. The leaders of these companies moved from a stage in which they had been rather uncomfortable using innovation as a concept because they did not have their own products or were not engaged in product development. Such vocabulary did not match their self-image as hardworking sub-suppliers who are efficient in what they do but do not really help advance the industry:

> . . . this [project] was supposed to be about innovation, and I felt rather hesitant to do it. It didn't really fit the vision. We're a pretty small company. . . we don't have our own products. . . so it felt a bit weird, this thing with innovation. . .'I didn't even dare to say the word 'innovation' in any context involving our company. To me, innovation was only about one thing, a product that you invent; it's about patents, research, laboratories, large research groups where you develop a new product for a new market, theories, yes.

With this organizational self-image at the outset of the project, the development during the projects was quite impressive. The same manager continues from the quote above and expresses the following:

> . . . we've learned quite a lot from this project. One part of it is that we're proud that we implement innovations. . . .We've realized that all of us do innovations, that we can make an impact, change, and

> come up with things. Our views, all the way from the management level to the individual co-worker, have changed.

From another company's perspective, becoming part of the research project was a challenge for a different reason:

> . . . I was very hesitant from the beginning whether I should be involved in such a project. . .I considered myself extremely innovative with lots of ideas. But what I may have forgotten was to include others on that journey. I just started and forced it into the business, so it's very much managed from the top down.

The manager continues to elaborate on how changes to how he perceives his own role in the organization have influenced the organizational self-awareness:

> . . . it may be the curse of an entrepreneur that you think you can manage everything on your own. But it has turned out that that's not the case; [throughout the project], we've gotten a really good activity going on throughout the organization.. . .If we see where we are today in comparison to when we started all of this, there's a big difference, of course. Today, I work much more with strategies and the entire organization.

We can also see how the reported deeper insights into innovation capabilities are connected with interaction with the project peers, how their whole way of viewing innovation changed, and how their organizational self-confidence was boosted through the other participants' feedback:

> That others have asked, seen, and investigated [issues and problems in and about their organization] has given us very much. It gives a kind of boost—really, that's fun. We've seen our own innovation capability in a completely different way, and it has sparked a positive spiral of new innovations.

4.1.5 An understanding of the potential in human interaction and communication. During the project, it was noticeable how the participants, both individually and in groups, came to appreciate the importance of inclusion. As the participants' own ways of understanding innovation advanced, and as they fundamentally changed the way they looked at their own businesses and the way they develop, it became increasingly important for them to understand and support one another in engaging the entire workforce in this transformation:

> . . . we've come to realize that the individual is important, all the way from the top to the bottom. . .it doesn't help that we write a new routine for everyone to be involved; we have to have that feeling and build that feeling to get there. That's something I believe we've learned in this project. It's an important part; it's the key to be able to move forward.

One of the managers realized during the project that he, in fact, was standing in the way for the others in the firm to be more engaged. He simply took up too much space. He says that he used to be the one with all the ideas, and the others just followed him out of obedience or perhaps convenience. He used to be frustrated that the others were not as committed as he was. During the project, the manager decided to take a step back and give more power to others:

> If I had involved them much earlier, which is what we do now. . .they'll tell you, 'No, you can't think like that because this and that will happen', because they work there every day. . .the best innovations you get, you get when they own it. When they come from the shop floor and start chasing white collar workers, that's when you've started it.

To include and involve the employees, one of the companies tried an activity it called *gather the group*. Irrespective of the task, the company would gather a group of people to obtain a wider range of ideas and input:

> . . . everyone is equally important, and we can learn a lot from one another. Many organizations have someone who's very dominant with lots of ideas; with this method, we also let others speak up. There might be many people who are more cautious and a bit quiet but who are very clever and spend a lot of time at work and at home thinking about potential aspects. You want to capture those.

We also saw an example of how the companies learned new ways to appreciate and enhance cross-functional communication through trying new work methods during the project:

> . . . we created a common platform, a common office where purchase, warehouse, and production management, all the ones who have many daily contacts with one another, sit together so that they can simply just talk to one another over the desk instead of moving to long meetings. So, we've shortened the ways of communication.

Related to organizational self-awareness and the importance of letting everyone be involved, one of the companies referred to its work with a special methodology:

> . . . when we've reached a stage with tangible suggestions, we put them into a sort of plan-do-control-action part, where we work on how to bring the process forward. In this group, when we use this method, we bring out the smartest [ideas] because it's built on the knowledge of each and everyone in the group. When they're allowed to participate and have a voice, it creates involvement, and you go from talking to actually doing, and doing creates value, partly building more value but also contributing to the culture in the company and encouraging co-workers to participate in many ways.

4.2 Linking business insights to project design, process and content

By identifying the five categories of business insights stemming from an interactive research project with SMEs we have shed light on the complexities surrounding knowledge creation in projects and associated learning outcomes. The following section focuses on how these five categories link to the design, process, and content of projects and on practices that can nurture conditions for knowledge creation in these types of settings.

First, we see that the category that captures an understanding of concepts and theories (in this particular case, concerning innovation capabilities and ambidexterity) relates to the content development of the research project. The participants not only captured mainstream definitions; they also formed their own understandings and beliefs. The learning outcome here is a change in mindset, as also mentioned by Ellström (1992). The participants also followed the way of reasoning addressed by Dewey (2002)—to learn while acting without exactly knowing what the outcomes would be. It is obvious that habits and assumptions (Moscovici, 1981) about innovation were disrupted (Dewey, 2002) during the project's collective activities (Granberg and Ohlsson, 2005; Ohlsson, 1996), such as the workshops. Reflection led to a new way of viewing innovation conceptually and to the use of an ambidextrous way of thinking in practice (Sollander and Engström, 2021). This implies that the project design and the actual process that the participants followed were essential for the content development.

The second category of business insights captures the impacts of collaborative, reflective work processes. This insight mirrors a deeper understanding and appreciation of what can be gained when reflecting on issues together with others with similar challenges in an open and trusting environment, just as what Edmondson (2011) calls for. The project activities, that is, the way the project was designed and executed, were founded in interaction, dialogue (Döös and Wilhelmson, 2011; Ohlsson, 1996), and reflection (Boud *et al.*, 2006; Dewey, 2002; Ellström, 2006; Wenestam and Lendahl Rosendahl, 2005), and gave the participants both challenges and support (Svensson *et al.*, 2009) in getting out of their comfort zone.

The third category of business insights captures that, by using emic and etic approaches (Chilcott and Barry, 2016) and feedback processes (Egan, 2002) in the project, participants could be aware of the meaning of their own organizational context in relation to their own and

others' challenges and struggles. They all seemed to, throughout the project process, have gained the insight that everyone has their own specific conditions to adhere to. They also realized that these are not necessarily unique. Therefore, it seems that being part of this type of process advanced the participants' ways of using their own contexts as stepping stones to develop their organizations further.

For the fourth category of business insights (an understanding of the importance of increased organizational self-awareness) we see signs of learning outcomes related to a deeper understanding of how the participants view their own company and the roles they play in their organizations. We argue that this is stimulated by the emic approach used in the data collection and the reflective activities in the project (Chilcott and Barry, 2016). This category of insights also indicates how project activities facilitated the avoidance of organizational traps and the participants' own defense behaviors (Argyris, 1994, 2010).

The fifth category of business insights emphasizes the potential for human interaction and communication offered by the design of these types of projects. We see how the project activities on inclusiveness and learning culture were supported by a climate in the research project of psychological safety (Edmondson, 1999) and the ability to learn from failure (Edmondson, 2011). The project activities also became role models for how the companies organized knowledge creation activities, i.e. the project process, and actively dealt with discrepancies and disturbances as learning potentials (Engström, 2014) within their own organizations.

These five insights originate from the project design, process, and content. The interactive and iterative design, including workshops and homework where the steering group decided the upcoming activities in the project, allowed the participants to investigate and dig deeper into their companies' challenges using the theoretical concepts discussed during workshops. This design ensured practical relevance for the companies, and during the process the companies gained a sense of project ownership which strengthened their engagement and gave them time for both self and organizational reflection. To continue the path of learning, the process was essential for continuously creating a trustful and open environment, which paved the way for critical dialogue, reflection and feedback, all of which are important aspects for learning. The project activities, such as inspirational lectures within the area of innovation, challenging and validating results, and the companies' own input sharing experiences acted as a final push for the five insights.

5. Discussion

In this project, the participants gained a new understanding of the impacts of collaborative, reflective work processes, along with new knowledge on concepts and theories. This type of knowledge creation corresponds to the knowledge type *episteme* (Gustavsson, 1996, 2000). Additionally, we have seen how the participants gained deeper understandings about the meaning of the unique context that their businesses, customers, organizations, and industries constitute together; about their organizational self-awareness; and about the potential for human interaction and communication for new, deeper insights. We connect this with the fact that the interactive cycles gradually made actions and thought patterns visible to the participants, which meant that they developed a reflection-based, deeper understanding, as suggested by Ellström (2011). This is also in line with the ideas of Granberg and Ohlsson (2005) and Ohlsson (1996) that suggest there is a learning potential in dealing with challenges in a social context. One example of this is a clear shift in how the participants jointly shaped new insights regarding innovation capabilities and ambidexterity, which, in the long term, can strengthen the strategic processes in their organizations.

It is noteworthy that many of the above-mentioned learning outcomes indicate not only the fulfillment of the purpose of the research project (related to innovation capabilities) but also the generation of additional results. Examples include understanding themselves as leaders, as well as insights into the potential of human interaction and communication for deeper insights, which are key life lessons that impact innovation and other business process developments. After the completion of the project, the participants seemed to understand the concept of innovation in a completely different way, on a more general level, and in relation to other phenomena in the organization. A concept they previously barely used in the organizations has become a convenient term to use in their businesses. A shift in the evaluation of both the phenomenon and of themselves seemed to have taken place, or *phronesis* (Gustavsson, 1996, 2000). In the project, innovation and unplanned work became linked to one another, and the participants seem to have gained knowledge of how these entities are connected, or *episteme* (Gustavsson, 1996, 2000). They also said that they had the opportunity to test and introduce many new methods, or *techne* (Gustavsson, 1996, 2000), during the project, which indicates that applied knowledge was activated. This is related to dialectical processes around the known that are challenged by the unknown and that provide new insights, as well as to the fact that the boundaries between theory and practice were blurred (Ellström, 2011). In sum, the interactive approach with the integrated learning cycles catalyzed all three of Aristotle's foundational knowledge types (Gustavsson, 1996, 2000).

We have managed to tease out several key practices in the project design, process, and content that have had a particular impact on the knowledge created. To start with, the participants' activities and attendance at workshops were consistent during the project, despite the many changes that took place in the management groups (i.e. people leaving for other companies). This indicates that commitment throughout the learning process remained; the companies' sense of commitment and value gained was strong. To achieve this, the project management team carefully aligned the project's research purpose and process with practical relevance (Geraldi and Söderlund, 2018) and fostered an inclusive, psychologically safe environment (Edmondson, 1999, 2011). Furthermore, the fact that the workshops facilitated reflection (Döös and Wilhelmson, 2011; Ohlsson, 1996) and enabled distancing from and the formation of perspectives on everyday problems appeared fundamental. Several participants attested that the resistance (Argyris, 2010) they previously had regarding the ability to be innovative was alleviated by the project's approach and dialogue. Another key practice associated with the project's design was the guidance provided by the iterative process and by steering group decisions on themes and the homework. This seems to have triggered a sense of project ownership and a focus on the companies' own input to the project. The participants described the comments they received from others in the project group as supportive, and various types of input, such as guest lectures, during workshops were considered challenging, according to the three important components of a learning process. Throughout the project, critical dialogue facilitated reflection, which led to deeper insights into the companies' own operations. In all, this supports the notion of steering, supporting, and challenging to create robust knowledge (Svensson *et al.*, 2009).

6. Conclusions

The purpose of this paper was to shed light on the different types of knowledge created in an interactive research project and to analyze how they are linked to the project design, process, and content. The key features of the project design, process, and content are all connected with state-of-the-art knowledge on how knowledge creation is orchestrated—stimulating psychological safety; steering, supporting, and challenging; and ensuring the alignment of theoretical rigor with practical relevance. In the present study, we confirm that this important knowledge and all three basic types of knowledge that were stimulated—*episteme*, *phronesis,* and *techne*—are

indeed transferable to the context of interactive research when using the project form, especially if the goals are to stimulate both intended and unintended learning outcomes, including reflective knowledge and insights.

In this paper we shed light on a key potential of interactive research project management, namely, how to obtain deeper and potentially more sustainable learning effects for the participating partners beyond the explicit project purpose at hand. We have studied how knowledge is created in relation to the project design, process and content.

First, we want to highlight the findings in our study which confirm previous studies. We confirm that Ellström's (2007); Ellström *et al.* (2020) model of interactive research indeed provides conditions for providing valuable insights into the research problem at hand. In our case, we studied how small and medium-sized companies could increase their innovation capabilities while better balancing innovation activities with daily operations. The published results from the project were highly dependent on the reflection, validation, and feedback that took place in our meetings with the participating practitioners. Our results also confirm earlier studies on the productive relationship between the different roles of researchers and practitioners in collaboration (Aagard Nielsen and Svensson, 2006) and the importance of the level of interaction in different phases of the research process (Svensson *et al.*, 2002; Cronholm and Goldkuhl, 2003) as well as the importance of *steering*, *supporting,* and *challenging* to create robust knowledge (Svensson *et al.*, 2009).

Second, we provide substantial additions to existing knowledge. Our study shows that the interactive and iterative approach with the recurring homework, workshops, and guided reflections contributed not only to joint knowledge creation in a broader sense, but also to deeper insights. We sometimes referred to the metaphor of peeling an onion in our workshops with the companies to show them how we, together, could gain a better understanding of the questions at hand using reflection. Our findings suggest an alteration of Ellström's model with an empowering, expanded view of the taken-for-granted interest of participants in the practice system. We saw that the practitioners were interested not only in practical issues or implications but also in the theoretical underpinnings of their problems; they played a pivotal role in creating theoretical knowledge. The results also complement earlier research by exemplifying and unpacking the key practices of interaction. For example, steering group meetings that assigned homework to the companies fulfilled the steering aspects of the learning process. Inspirational and theoretical lecturers seemed to challenge existing knowledge and mindsets, while feedback meetings and workshops supported knowledge creation and strengthened work with innovation and meta-reflection. A surprising finding was that the interactive and iterative model changed the mindsets of the participating company representatives and increased organizational self-awareness. This, in turn, formed a crucial basis for driving change in work methods and making investments in the organizations, as well as for changing assumptions about customer offerings. While these theoretical contributions primarily belong to the domain of knowledge creation and interaction research, we also contribute more specifically to the field of project management research by illustrating how knowledge creation can take place in practice through examples and rich empirical accounts, thereby contributing to the call by Lindhult and Axelsson (2021) to expand project management research.

Project management scholars can also find practical implications for research in our study. Research seeking to examine the conditions for reflexive knowledge creation and deeper insights can benefit from searching for evidence of the key features of the project design, process, and content, as indicated in the discussion section. Researchers who are eager to design their own interactive, collaborative research projects can hopefully also be inspired by our learning loop design and the transfer of theoretical state-of-the-art knowledge into hands-on practical activities.

We advise practitioners interested in expanding the outcomes of projects beyond the explicit targets to pay careful attention to how they set up their projects. They need to make room for iterative reflection, be mindful of creating a trusting and open environment in the team, challenge results with opposing views and theories, and make room for sharing experiences and giving feedback. In doing so, our study suggests that it is possible to gain deeper insights into complex issues that have the potential to have long-lasting effects on both people and businesses.

There are particularities in a study that are not fully captured and explained. While we cannot tease out any direct cause–effect relationships between specific activities and specific learning outcomes, we can conclude a relationship between the project design, process, and content with the identified learning outcomes. Similarly, while we can verify that learning has taken place, we cannot quantify the learning outcomes in terms of how many participants have gained knowledge. Further research is needed to validate our findings, so we encourage other authors to adopt the presented research process and activities and to focus on the meta-analysis of the impacts that the process has on the outcomes. Preferably, this could take place by assigning a dedicated researcher to follow this process in parallel to the focal problems defined in the project.

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Corresponding author
Annika Engström can be contacted at: annika.engstrom@ju.se