ANTECEDENTS OF ABSORPTIVE CAPACITY IN KNOWLEDGE-TRANSFER PROJECTS: WHAT AFFECTS THE ABSORPTIVE CAPACITY OF THE RECIPIENT PROJECT TEAM?

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Abstract
For many companies, planning and executing effective knowledge transfer with external organizations is becoming increasingly relevant. However, the complexity of such processes often results in high failure rates. By taking the perspective of the recipient organization in a knowledge-transfer project, this research aims to identify the antecedents of a recipient project team's absorptive capacity. Empirical evidence from the case of a multi-national energy company transferring technological and organizational knowledge from its UK to its Swedish subsidiary is combined with findings from prior research in order to develop a set of research propositions.

Keywords: *knowledge transfer; absorptive capacity, project management, antecedents of capacity, ambidexterity, planning*

JEL Codes: *H43, M11, L1, D83*

I. INTRODUCTION

Many companies are finding that planning and executing effective knowledge transfer with external organizations is increasingly relevant. The benefits of successful knowledge transfer include reduced costs and risks in research and development (R&D), enhanced proficiency and speed in new product development, leverage of multidisciplinary technologies, and know-how that can facilitate flexible manufacturing strategies.

However, knowledge transfer is also a highly complex activity that is fiendishly difficult to manage. In one field study, 10 out of 32 knowledge-transfer projects failed, mainly because of inadequate pre-transfer planning and post-transfer control (Galbraith 1990). For example, General Motors' attempt to promulgate Japanese operational management approaches throughout its organization resulted in production losses of $2 billion a week (Javidan, Stahl et al. 2005). Therefore, knowledge transfer between units must be carefully organized and managed, on both the sender's and the recipient's side (Argote, McEvily et al. 2003, Easterby-Smith, Lyles et al. 2008, Zhao and Lavin 2012). Moreover, the key factor for success is the recipient's absorptive capacity (Lyles and Salk 1996, Szulanski 1996, Lane and Lubatkin 1998, Tsai 2001, Argote, McEvily et al. 2003, Park and Kang 2009).

Cohen and Levinthal (1990) defined absorptive capacity (AC) as the ability to recognize the value of new knowledge, assimilate it, and apply it to commercial ends. According to the authors, AC is mainly built on previous investments in internal R&D. A review of the literature on AC (e.g.,Volberda, Foss et al. 2010, Lewin, Massini et al. 2011) reveals two recurrent characteristics of existing studies. The first is that they focus on the firm level of analysis, proxying AC with aggregate variables such as R&D expenditure or the size of patent portfolios (Mowery, Oxley et al. 1996, Cockburn and Henderson 1998, Tsai 2001). The second characteristic is that these studies tend to take a strategic-management perspective, since they explore the strategic mechanisms required to develop AC, and the subsequent effect of AC on competitive advantage (Van Den Bosch, Volberda et al. 1999, Lane, Salk et al. 2001, Tsai 2001, Feinberg and Gupta 2004). By emphasizing the business benefits of AC at the organizational level, the abovementioned studies have neglected the antecedents of AC and how it is developed at the project level.

To address this research gap, this research aims to study AC at the project level and identify the most significant antecedents of the recipient project team's AC in knowledge transfer. Investigating AC at the project level represents an interesting and useful research effort for three reasons. First, knowledge transfer between units usually occurs through the execution of day-to-day operational activities that are part of well-defined projects (Zander and Kogut 1995, Argote 2012). Second, knowledge transfer builds heavily on interactions between project team members, who possess predominantly tacit knowledge (e.g.,Szulanski 1996, Kostova and Roth 2002, Levin and Cross 2004). Third, AC research at the project level is important for understanding how AC is exploited in the active context at the project level – and, in relation to its accumulation in the latent context, at the organizational level too (Argote and Miron-Spektor 2011).

Using an inductive approach, we aim to explore how the AC of the recipient project team is developed and gain a deeper understanding of its antecedents. Rather than attempting to identify all antecedents, we have focused on those that seem most influential on the recipient project team's AC during the execution of knowledge transfer. The case for our study is a multinational energy company that actively transfers technological and organizational knowledge between its local subsidiaries. By combining evidence from the case study and the results of prior studies on technology management, we develop some research propositions.

The remainder of this article is structured as follows. Section 2 presents the literature review regarding absorptive capacity, followed by methodology in section 3. The findings from the case study are then reported and discussed in section 4. Finally, in section 5, conclusions are drawn and some avenues for future research are outlined.

II. LITERATURE REVIEW ON ABSORPTIVE CAPACITY

Absorptive capacity has recently emerged as a central theme in strategy and organization research (Lane, Salk et al. 2001, Volberda, Foss et al. 2010). AC-related issues have been discussed in several streams of research, such as economics and innovation management, business performance, knowledge transfer, and organizational learning (Gupta and Govindarajan 2000, Tsai 2001, Moos, Beimborn et al. 2013).

Seminal papers have conceptualized the multidimensional nature of AC (Cohen and Levinthal 1990, Zahra and George 2002). Cohen and Levinthal (1990) distinguished between the different components of AC (recognition, assimilation, and exploitation) and posited that it does not reside within a single individual, but rather consists of links between many

different individuals' abilities. Later, Zahra and George (2002) conceptualized AC as a dynamic capability consisting of two dimensions. One – potential AC – captures the firm's ability to identify useful external knowledge and assimilate it into its own routines and systems. The other – realized AC – captures the firm's ability to transform and exploit newly acquired knowledge. Crucial activities within realized AC include adaptation, combining new and existing knowledge, and incorporating further new knowledge into ongoing operations.

In reviewing the AC literature, we found two main gaps. First, much of the literature has tried to measure AC through a range of firm-level proxies such as R&D expenditure, number of R&D employees, or size of patent portfolio (Mowery, Oxley et al. 1996, Ahuja and Katila

2001, Meeus, Oerlemans et al. 2001). The rationale behind these choices is that firms with a larger and richer endowment of knowledge resources develop appropriate routines and processes that facilitate the acquisition and use of external knowledge, which results in higher levels of AC (Mowery, Oxley et al. 1996, Rao and Drazin 2002).

Second, most studies have focused on the competitive benefits of AC; that is, the impact of AC on organizational and financial performance. For instance, AC has been found to enhance the learning ability of a firm (Lane and Lubatkin 1998) and to improve the speed and frequency of innovation, (Helfat 1997). Furthermore, Lane, Salk et al. (2001) showed that, through AC, firms apply new knowledge to commercial ends and thus achieve superior financial performance. By assessing the role of AC as a source of competitive advantage, prior research has mostly adopted a strategic-management perspective (Lyles and Salk 1996, Mowery, Oxley et al. 1996). Conversely, there is a lack of studies at the project level of analysis (Backmann 2014), and only a few studies have analyzed the organizational antecedents of AC (Jansen, Van Den Bosch et al. 2005, Volberda, Foss et al. 2010). The most notable is by Jansen, Van Den Bosch et al. (2005), who analyzed the effects of a set of managerial antecedents on the different dimensions of AC, both potential and realized. The authors showed that coordination mechanisms such as cross-functional interfaces and job rotation are positively linked to potential AC, while practices that focus more on systematization (such as formalization) and socialization (such as connectedness) enhance realized AC. However, no empirical evidence has been provided about the microfoundations of AC at the project level, despite the fact that knowledge transfer occurs through the execution of day-to-day operational activities within well-defined projects, and that AC is built through interactions between project team members and through the integration of their tacit knowledge.

To overcome these limitations, this research aims to explore how the AC of the recipient project team is developed. We identify the most significant antecedents of the recipient project team's AC, while acknowledging that we cannot identify all such antecedents, and investigate their impact on the recipient project team's AC dimensions. We take a project- level perspective, in which the project is considered as a peculiar organizational form, characterized by a unique task, with a predetermined time and consisting of individuals with the necessary specific background to perform this unique task (Lundin 1990, Söderlund 2004).

III. METHODOLOGY

Our empirical analysis is based on a single-case-study methodology. Taking an inductive approach, we identify links between our research objectives and findings derived from the data, and ensure that these links are transparent and defensible (Thomas 2006, Corbin and Strauss 2008). We report and discuss the phenomenon of deliberate and organized knowledge transfer in a multiyear project at a firm that we have investigated longitudinally in the course of our research.

The major limitations of a single-case-study method are validity and reliability (Yin 2014). However, this methodology offers us the opportunity to gain an in-depth understanding of a complex phenomenon under particularly insightful circumstances, which enables us to identify the still-elusive antecedents of AC and their effect on the recipient project team's AC dimensions.

As Siggelkow (2007) argued, this use of a case study allows readers to see a practical example of the theoretical constructs identified by existing research and their relationships, and to understand how the conceptual arguments might be applied to other empirical settings. In order to further the goal of the research, the selected case study must be "special"; that is, it must provide empirical insights that other cases would not (Siggelkow 2007). Accordingly, we have carefully selected a knowledge-transfer project in which the recipient team's AC is crucial for success (Szulanski 2000). In keeping with our aim of following the project longitudinally, the selection of the case was also justified by the full access to documents and meetings that one of the authors was granted. In addition, one of the authors was able to interview project-team members without restrictions.

The focal case is a knowledge-transfer project in which a multinational company operating in the energy, health, building, and industrial sectors divested its UK energy subsidiary and aimed to transfer relevant technological and organizational knowledge back to divisional headquarters in Sweden. The knowledge to be transferred related to the design and manufacture of small gas turbines for industrial power generation. The project lasted for 30 months, which enabled a longitudinal study in which the cause-and-effect dynamics between identified antecedents and the dimensions of AC could be tracked in real time (Leonard- Barton 1990).

The recipient organization at divisional HQ in Sweden was organized into a project team with members covering disciplines such as engineering (subdivided into electrical, control, and mechanical), purchasing, quality assessment, logistics, documentation, assembling, and manufacturing. These disciplines served as the template for the division of the main project into constituent sub-projects. All sub-project managers reported to the head project manager, who was responsible for coordinating the transfer of technical and organizational knowledge from the UK subsidiary and incorporating it into the Swedish HQ's existing routines and processes.

Our data were collected through three sources: semi-structured interviews, participation in project meetings, and internal documentation. Crucially, one of the authors spent every second week in the receiving organization, with full access to project documentation and the opportunity to ask questions and seek clarifications from team members. We interviewed all members of the project in order to get a deep understanding of the engineering and management aspects of the main project and each of its sub-projects. This multi-perspective approach helped us identify and analyze the relations between identified antecedents and AC dimensions, given the multidisciplinary nature of the project, and helped reduce the risk of retrospective and personal interpretation biases, which could have undermined the construct validity of the case-study research (Yin 2014).

Our semi-structured interviews lasted approximately one hour and were documented through contemporaneous notes. Other spontaneous informal interviews lasted for an average of 15 minutes and served to reveal details about phenomena and their relations. Having collected preliminary information through interviews, we contacted project members again in order to confirm our interpretation of the information they had provided us. Furthermore, participating in project meetings enabled us to acquire insights into project members' interpersonal relationships and the coordination mechanisms they used, which did not emerge in the preliminary interviews but were confirmed in a second round of interviews with involved members. By examining internal documentation such as minutes of meetings, email exchanges, and manuals, we managed to triangulate information in order to avoid post hoc rationalization and ensure construct validity.

Based on observations and interviews, we identified the four antecedents that emerged as most significant for the development of the recipient project team's AC. These four antecedents were also reconfirmed by interviewees. We then grouped the collected information from interviews in accordance with the identified antecedents of the recipient project team's AC. We analyzed the interview responses, observations, and project documentation that related to each antecedent; in the process, we coded keywords relevant to the specific practice. For example, for planning "work breakdown structure", "scheduling" and "time pressure" and in regard to the construct of AC "knowledge search", "knowledge absorption" and "knowledge application". Such analysis provided us with a good understanding of the observations, and offered empirical evidence of the links and relationships between the identified antecedents and the dimensions of absorptive capacity.

IV. RESULTS AND DISCUSSION

Spending time with the project team in the recipient organization provided many insights about knowledge transfer and the quest to absorb new knowledge. Our observations and first- round interviews revealed many factors that affected the AC of the recipient project team, but four antecedents stood out as having the strongest impact: project team structure, multifunctional steering committee, planning of activities, and participation in decision- making (Gaddis, 1959, Packendorf 1995, Dvir et al. 2003, Lechler and Cohen, 2009).

Empirical evidence on how antecedents were identified and results regarding their effect on AC dimensions is presented in the following sections, along with our research propositions. Interview quotes are then presented in Table 1.

4.1. Project team structure

Our empirical evidence shows that a project team structure in the form of a taskforce separated from the rest of the organization, as proposed in Larson and Gobeli (1988), enhances the project team's ability to absorb knowledge. As well as separating the project team from the rest of the organization, this structure also gives the project manager full authority, without the involvement of departmental managers, and the team members are assigned to the project on a full-time basis (Köster 2009).

In our study, the finding that AC is enhanced when this structure is used emerged when comparing the project team's proficiency in the initial phases of the knowledge-transfer project with the later phases. Originally, the project was organized as a balanced matrix structure in which the project manager shared responsibility with functional department managers, and team members were assigned to several projects (Kolodny 1979). We observed that the level of knowledge absorption was poor, since members tended to fall back on their routine activities and neglect project tasks. Furthermore, the involvement of department heads created much confusion, and interfered with knowledge acquisition. Later, it was decided to switch to a project team structure with taskforce members fully dedicated to the knowledge-transfer project. According to the sub-project managers and engineers interviewed, search and acquisition for knowledge were improved, since team members could concentrate fully on the task and coordinate with each other better. Assigning full authority to the project manager helped him to create a common path for the project team, and support the team in their effort to understand and assimilate new knowledge.

Engineers and sub-project managers claimed that when they sat together they could cooperate more easily and informally, with the opportunity to discuss issues and ask questions as they arose. This strengthened the coherence of the group, which positively influenced the search for and understanding of new knowledge. Stronger interaction between staff with heterogeneous backgrounds fostered the incorporation of different competencies: electrical and mechanical engineers were pushed to cooperate in jointly understanding the functioning of different auxiliary systems in the turbines, instead of approaching such systems each engineer individually. Furthermore, the project manager was the only person giving instructions consistent with the project goal, without any involvement from line managers.

This finding can be explained by considering the complex and cognitive nature of AC. Knowledge transfer is a one-off activity that may be overwhelming for some team members if their natural reaction is to prioritize other known and routine tasks. A project team structure can counteract such behavior. The product-development literature shows that the performance of the project team is enhanced when team members are protected from organizational interruptions (Peters and Waterman, 1982). Additional benefits of this structure include more effective coordination and exploitation of each other's competencies (Henderson and Cockburn 1994), which is particularly important in the light of the cross- disciplinary nature of AC. Indeed, Van Den Bosch, Volberda et al. (1999) found that combining different competencies in the project is positive for AC. In the light of the empirical findings, which only refer to the recognition and assimilation phases of AC, we posit the following proposition:

P1: Project team structure is positively related to the potential AC of the project team.

4.2. Multifunctional steering committee

Our empirical study suggests that establishing a steering committee to direct a knowledge- transfer project is particularly beneficial to potential AC. Steering committees are often made up of senior managers drawn from different functions, to whom the project manager reports, and from whom they seek support (Englund and Bucero, 2006). Additionally, the steering committee supports a project with the necessary resources, manages conflicts, and straightens out political games in order to improve decision-making (Gupta and Raghunathan 1989, Karimi, Bhattacherjee et al. 2000).

At the beginning of the project in our study, it was unclear what knowledge needed to be transferred between the sender and the receiver. The two parties involved had different opinions about this, as well as different motivations and objectives. This imperfect alignment between sender and receiver hampered the transfer of knowledge. Consequently, a steering committee was created, including representatives from both parties, with the aim of establishing a single approach and a shared direction. According to the manager of the recipient project team, it became much easier to search and acquire knowledge from the sender once important decisions and clear instructions had been made by the steering committee, and this facilitated the comprehension of acquired knowledge.

These findings are a result of the collaborative nature of knowledge-transfer projects, whereby people from distinct entities or firms work together to share knowledge. An organizational mechanism such as a steering body is important to reconcile contradictory views on the management and execution of the project, and to prevent or resolve conflicts that hinder the absorption of new knowledge. This is consistent with the work of Lane and Lubatkin (1998), who showed that a single overarching organizational body enhances inter-organizational learning by reducing differences and deviations between parties.

In our case, the role of the steering committee helped increase efficiency in knowledge integration by clarifying the aim of the project at a higher level without getting involved in lower-level decisions and actions; this gave the team more learning opportunities (King and Teo 1994, Sobrero and Roberts 2001). Furthermore, the interaction between sender and receiver is more pronounced during the initial phases of the project, when the knowledge held by the sender has to be identified, transferred, and assimilated by the recipient. In the subsequent transformation and exploitation phases, the recipient acts in a more autonomous way, with the goal of implementing the newly insourced knowledge and integrating it into existing internal processes and routines. As a consequence, the role of the steering committee as a mechanism to ensure unity of intents is less critical. Our empirical observation leads us to posit the following proposition:

P2: The establishment of a steering committee in knowledge-transfer projects has a positive influence on AC. This influence is stronger on potential AC than on realized AC.

4.3. Planning of activities

The empirical analysis indicates that the planning of the knowledge-transfer project affects the two dimensions of AC – potential and realized – differently. Conventional project- management techniques offer guidance on planning projects, for example through the work breakdown structure (WBS). This practice consists of identifying activities that must be performed, their sequence, and the relations between them (Wolf 1989, Packendorf 1995).

Following conventional wisdom, the project manager started the project in our study with planning activities. At first, this was done in a way that reflected the product structure of other turbines at the recipient organization. Following this criterion, a work breakdown structure of the project was developed with work packages corresponding to the different components of the turbine. However, it was soon acknowledged that this planning approach hindered team members' ability to explore and investigate aspects of the sender's knowledge that were not documented or codified. Planning with subsequent scheduling of activities prevented engineers from thinking freely and exploring, because they were obliged to stick to the plan rather than spending time exploring and understanding new knowledge.

The specific approach to planning also caused problems. First, the structure of the turbines about which technical knowledge was to be transferred was different from those being designed and manufactured in Sweden. Second, planned project activities allowed the transfer of explicit knowledge, drawings, and documents held by the sender, but they completely failed to capture the tacit aspects of that knowledge – that is, exactly how the UK engineers could design and manufacture that particular type of turbine. Furthermore, engineers felt that they were always pressed for time, because of all the timed milestones in the plan.

In the light of these difficulties, the project manager decided to "relax" the plan and give more freedom to the team members in terms of what activities to perform, what tests to run, and how to interact with the British engineers. One team member recalled that he stopped spending time searching for documents about the design of the lubrication oil system, and started to question his UK counterpart about the procedure he had personally used to engineer the system. Consequently, the proficiency of knowledge assimilation increased.

On the other hand, once critical knowledge was transferred from the sender, precise planning helped the project team adapt it efficiently to extant routines and structures. Planning made it easier for team members and the project manager to arrange the activities necessary to exploit the knowledge in the right sequence, and at the right time. One of the sub-project managers explained that once the team had acquired and understood knowledge about the new gas turbines, planning provided a platform with which to integrate and transform that knowledge into routines and processes. This eliminated speculation and unnecessary discussions, and consolidated ideas and ways of working across the whole team. Engineers also expressed the positive effect of milestones and deadlines, which encouraged them to act and package new knowledge promptly.

This dissimilar impact of planning on the two dimensions of AC can be explained by the differing natures of potential and realized AC. Potential AC has an exploratory nature, because is difficult to know in advance which bits of knowledge are most valuable, and who possesses them. Realized AC, on the other hand, is about being efficient in the exploitation of new knowledge and ensuring it provides commercial benefits to the firm. Therefore, formalized and structured planning may act as a constraint on the development of potential AC, possibly paralyzing the team and hindering improvisation and creativity. But when it comes to exploitation, systematic planning creates the optimal path that the team can follow to achieve the project goal in the most efficient way. This path can be confidently planned in advance, given the lower level of uncertainty that characterizes activities in realized AC.

Scheduling activities will increase focus and efficiency in knowledge exploitation, but will have the opposite effect on explorative learning (Lawson 2001, Vonk, Geertman et al. 2007). In contrast, a more relaxed schedule will have a positive effect on knowledge exploration and a negative effect on knowledge exploitation (Lawson 2001, Richtnér and Åhlström 2006). Indeed, according to Galunic and Rodan (1997), creating excessive rules and procedures to govern project work impedes the acquisition and assimilation of knowledge, while a structured and formalized environment improves knowledge transformation and exploitation. Therefore, we posit the following propositions:

P3: The stricter the planning of the project, the lower the project team’s potential AC.

P4: The stricter the planning of the project, the higher the project team’s realized AC.

4.4. Participation in decision-making

The empirical evidence that we gathered reveals that granting decision-making power to team members through decentralized leadership has positive effects on potential AC. With decentralized project leadership, decision-making power is devolved from positions of authority to the location of knowledge that is relevant and required for decision-making. This reduces the number of filters through which the information needs to pass, as well as the time required to reach the final decision. Decision quality is also improved when decentralized leadership is practiced (Geber 1990).

An example of delegating operational decisions in the analyzed case involved the electrical sub-project manager, who was given full authority to decide on the approach to understanding the function of the motor control center auxiliary system, either by perusing drawings and documents or by spending time in the assembly workshop and watching the building of the system. This freedom encouraged the sub-project manager to use his creativity and skills to find the best way to identify and assimilate needed knowledge at the sender’s side. The head project manager acknowledged that involving subordinates in the decision-making process was important to leverage their heterogeneous expertise, which in turn helped him understand the overall scope of the new knowledge to be absorbed.

In another instance, the head project manager was interfering with the work of the mechanical sub-project manager, which hampered the latter’s understanding of new knowledge. After several interventions and complaints from the sub-project manager within three weeks, the project manager distanced himself from mechanics, at which point the sub- project manager found it easier to acquire and assimilate new knowledge. Based on this experience, the project manager stopped intervening in the work of all project team members, but remained available to support and check their progress.

This result can be interpreted in the light of the Decentralization of Incentives Theory (Gianakopulos and Milgrom 1991), according to which, in a context of high uncertainty and unpredictability such as that in the early phases of knowledge-transfer projects, delegation of responsibilities allows better decision-making because local experts (such as sub-project managers) enjoy a larger information advantage vis-à-vis top managers. Participation in decision-making not only means an increase in the quantity and quality of ideas and proposals, but also that those ideas and proposals are implemented and pursued (Sheremata 2000).

In contrast, we find that delegation has a negative impact on realized AC. Our empirical analysis suggests that, in the exploitation phase, having a plethora of decision makers following their personal opinions about the best way to transform and use externally acquired knowledge may be suboptimal in terms of time and resource usage. As the project manager pointed out, the key performance objective in realized AC is efficiency, which is more easily achieved by sticking to a top-down plan than by spending too much time reaching a consensus. Having given a lot of freedom to all members in the beginning, the project manager saw that this approach became less ineffective once new knowledge and technology was being transformed and incorporated into existing processes and routines. Therefore, he decided to listen to all members and then make a decision himself, rather than waiting for consensus to be achieved. This improved efficiency, as well as satisfaction among team members, because they did not need to spend time on endless discussion.

This is a result of the executive nature of realized AC, which is exercised in a context characterized by lower uncertainty. Developing a consistent way of working during implementation creates a predictable working environment for team members. According to (Atuahene-Gima 2003), delegation requires consensus about the decision made, which may have a negative effect on the efficiency of knowledge transformation and exploitation. Therefore, we posit the following propositions:

P5: Team members' participation in decision-making enhances the project team's potential AC.

P6: Team members' participation in decision-making hinders the project team's realized AC.

Table 1 reports a selection of quotes from interviewees supporting P1–6

Proposition	Quote(s)
Proposition 1: Project team structure is positively related to potential AC of the project team.	"I couldn't concentrate on the transfer project until it was assigned to me as my only task." (Electrical engineer at recipient side) "I was confused because my line manager was involved, and kept interfering with the actions that I had agreed with the project manager. It all became simpler and more efficient when the project manager was the only authority in the transfer project." (Mechanical engineer at recipient side) "Having people dedicated 100 percent to the transfer project helped them to grasp the new technology, as it takes some time to dig in and figure out what we were about to receive." (Project manager at recipient side) "Having the opportunity to work with other team members separated from the rest of organization was important to understand how my portion of the transfer was hanging together with other disciplines." (Control system engineer at recipient side)
Proposition 2: The establishment of a steering committee in knowledge transfer projects has a positive influence on AC. This influence is stronger on potential AC than on realized AC.	"We – the sender and receiver – had different views on what should be transferred and how we should collaborate. It was impossible to make any progress. The involvement of the upper management forced us to work together and to understand new technology." (Project manager at recipient side) "It was frustrating to sit and discuss how things should be done, because lower management had different opinions on many things. Too many cooks spoil the broth." (Product manager at recipient side) "At the beginning it was a waste of time to visit the sender, as we had contradictory views on almost everything. A prerequisite to be able to learn anything about the new technology was to have top management make early decisions on how to proceed." (Mechanical engineer at recipient side) "I had a feeling that in the beginning we had even different opinions on the formula for Ohm's law [laughs]." (Electrical engineer at recipient side)
Proposition 3: The stricter the planning of the project, the lower the project team's potential AC.	"Initial planning was paralyzing the team. People spent all their time trying to meet the schedule and didn't make any progress in understanding what should be transferred." (Project manager at recipient side) "Planning created constraints for me and I was distracted by the plan. It didn't help me to capture what the new technology was about at all – it just took up all my time trying to follow the plan." (Electrical engineer at recipient side). "At every meeting I felt lousy because I was focusing on the plan and how to fulfill it. I always felt the plan was more of a hindrance than a help. It was stealing time away from important work that should have been done." (Liquid fuel system engineer at recipient side) "It is stupid to make a plan when you don't know what should be

Proposition	Quote(s)
	transferred. First you understand what the new technology is about and what should be acquired, then you can make some plans." (Structure system engineer at recipient side)
Proposition 4: The stricter the planning of the project, the higher the project team's realized AC.	"While planning was disturbing the team in the beginning as it was limiting the team, it helped afterwards when we'd got into our stride and knew what we were about to transfer. It helped to direct the transfer and to integrate new technology in our routines." (Project manager at recipient side) "In the later stage of the project it really helped to have a clear plan of the path to walk, and the schedule of what to do when." (Acoustics engineer at recipient side) "The plan and directions from our project manager eliminated unnecessary timewasting in the exploitation phase and made integration more efficient." (Electrical engineer at recipient side)
Proposition 5: Team members' participation in decision-making enhances the project team's potential AC	"Involving all team members helped us understand the new technology better, as well as sharing ideas and hints on how to approach drawings and specifications. I was expected to lead the team, but sometimes I couldn't go further without involving my staff, as the idea reservoir was empty! [laughs]" (Project manager at recipient side) "I appreciated the way the PM involved the whole team in the initial discussion as I could learn from others how they were doing and even share what worked – and what didn't." (Mechanical engineer at recipient side) "It was good to have space for us to say what we thought and what was really going on, and to have the opportunity to tell the project manager what we should do and why. I felt empowered to bring real problems within my domain to the table, and to contribute to making the best decision about them." (Electrical engineer at recipient side)
Proposition 6: Team members' participation in decision-making hinders the project team's realized AC	"In the later phase of the project it was more efficient when I made decisions about most issues by myself. Having everybody chatting and sharing opinions about everything took ages. Overall, having a clear logic about integrating new technology is most efficient." (Project manager at recipient side) "Having clear instructions on how to do something, without the need for asking and discussing how to proceed, helped me a lot when implementing new technology in our processes." (Control system engineer at recipient side). "I think it was good that the project manager made practical decisions about what we should do in the integration stage, and it was efficient to come to the meetings knowing what was expected from me. It was also good to avoid endless discussions about which way to go – especially since all the options were pretty much the same." (Mechanical engineer at recipient side)

V. CONCLUSIONS

The research provides results that shed new light on AC at the project level, and a set of research propositions that represent a promising starting point for future confirmatory research. Our findings show that practices such as project team structure, steering committees, project planning, and decentralized leadership are key antecedents to the development of the recipient project team's AC. According to the empirical evidence we have gathered, different practices affect the two dimensions of absorptive capacity in varying ways. These results point to the sharply contrasting nature of potential AC vis-à-vis realized AC, and the consequent need for different managerial systems at different occasions during the project execution. From this point of view, AC may resemble the multidimensional concept of ambidexterity, which is achieved by balancing exploration and exploitation. Consistent with Tushman and O'Reilly's (1996) structural view of ambidexterity, we argue that dual structures and management – one focused on the recognition and assimilation of external knowledge, the other on its transformation and exploitation – may be beneficial for the overall development of AC. A natural question arising from this study is whether the potential and realized dimensions of AC should even be part of the same overarching concept.

With regard to managerial implications, this research provides several recommendations to improve the absorption of new technological knowledge from external units. These suggestions should be treated as prompts for identifying the solutions that are right for managers' own organizations, rather than best practices or blueprints for success. In particular, our study shows that a one-size-fits-all approach to knowledge-transfer project management should be avoided.

The study has obvious limitations. Because it is a single-case study, its results cannot be generalized. They could only be analytically extended to other firms of comparable size operating in manufacturing industries, which have designed and operated project- management systems to transfer knowledge across units. In such companies, we could expect an analogous role for AC in enhancing project outcomes, and for project-management practices in developing the two dimensions of AC.

Future research should aim to enrich the propositions proposed in this research through the analysis of other representative cases in different contexts, and to validate the relationships suggested through large-scale empirical analyses. Another interesting avenue for future research would be to explore where AC originates, how it evolves, and where it finally resides. We expect the individual-level characteristics of the people involved in knowledge- transfer projects to play a critical role in the development of collective firm-level capabilities such as AC.

In our study, we observed the importance of individuals and their AC as the foundation of team AC. Future research should investigate how personal traits and cognition affect individuals' AC – not just "what you know," but "who you are". Training, education, and experience also seem to be important determinants of individual AC – i.e. "what you've done." A third significant factor was context and environment, which triggered and facilitated the development of team AC – i.e. "where you are." We believe that taking an interactionist perspective on these three factors will provide a deeper understanding of how organizational AC is developed and what it is "made of."

VI. REFERENCES

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