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The Early Stage of Digital Technology Adoption: What Are the Key Activities for Identifying Digital Innovations?

Completed Research

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Abstract

Digital technologies offer companies opportunities to achieve competitive advantages or to respond to market challenges. For digital innovation, it is important to have a solid decision-making basis for or against the adoption of a digital technology. Therefore, companies need the capability to identify and monitor developments in digital technologies as well as in the market environment and incorporate these insights into the innovation process at an early stage. Prior research has explored the capabilities that companies need to succeed here. In this paper, previous findings are confirmed and extended by examining in detail the related activities that companies perform in practice. Drawing on the dynamic capability approach as a theoretical foundation and a multiple-case study, results reveal seven key activities that support the sensing capabilities for digital innovations.

Keywords

Digital innovation, innovation process, sensing capabilities, innovation capabilities.

Introduction

The adoption of digital technologies can offer companies the opportunity to expand their range of products and services or to improve processes (Yoo et al., 2010). However, new developments in digital technologies can lead to far-reaching changes in the business environment and competition, i.e., digital innovation can have an impact on the entire organization and its environment (Kohli and Melville, 2019). Digital innovation differs from innovations based on earlier technologies because "digital innovation requires the use of digital technology" (Yoo et al., 2010, p. 726), meaning that digital technology is always part of the outcome of digital innovation, for example, as a product, to provide services, or to support processes or business models (Hund et al., 2021; Nambisan et al., 2017). The ability to adopt digital innovations therefore includes the early identification of emerging developments in digital technologies, market changes, and customer needs, as well as the use of these insights to develop digital opportunities for a company (Schoemaker et al., 2018; Teece et al., 2016).

There are many studies on the adoption of digital innovations using the dynamic capabilities perspective. The concept of dynamic capabilities describes the abilities of an organization to respond to changes in a fast-changing environment by expanding or modifying its resources (Teece et al., 1997). Dynamic capabilities are composed of microfoundations that comprise activities of individuals and the organization (Eisenhardt et al., 2010).

Abilities for spotting digital technologies and changes are discussed in previous research using the concept of dynamic capabilities in a number of different areas (see e.g., Helfat and Raubitschek, 2018; Li et al., 2018). Many studies consider digital innovation and dynamic capabilities at a high level of abstraction, and the literature calls for more in-depth research on how companies develop digital capabilities in practice (Verhoef et al., 2021), or, as Vial (2019) pointed out, a closer look at the work done by actors that support dynamic capabilities. Therefore, research needs to continue on the question of what the microfoundations look like in detail.

Consequently, our study aims to identify activities that companies conduct in practice to recognize digital innovation opportunities. In this research, we draw on the overarching concept of dynamic capabilities and what companies do at the beginning of the innovation process. We answer the research question: What activities support the sensing capabilities for digital innovations? In particular, we look at the question of how companies proceed to identify opportunities for digital innovation, what corresponding activities they carry out for this purpose, and what supports these activities in practice.

A qualitative approach was adopted for our study. First, we examined the literature on dynamic capabilities and microfoundations related to the identification of developments in digital technologies and changes in the business environment. Then, a multiple-case study was conducted. For this purpose, companies were selected that have many years of experience with digital innovation initiatives and have implemented programs to promote digitalization projects.

We found seven key activities that are aligned to the two microfoundations for identifying developments in digital technologies and exploring market changes and trends. These findings extend the current literature on digital innovation adoption and dynamic capabilities for identifying digital innovations.

This paper is structured as follows. The next section provides a brief introduction into related research on the innovation process and dynamic capabilities as well as their microfoundations in the context of digital innovation. Then, the research design is outlined. We subsequently describe our multiple-case study, illustrate the results, and close with concluding remarks.

Digital Technology Adoption and Dynamic Capabilities

As theoretical basis for our study, we combine the innovation process in organizations (Rogers, 2003) with the theory of dynamic capabilities (Teece et al., 1997). Rogers (2003) describes two main phases that constitute the innovation process: the 'initiation' phase at the beginning and the 'implementation' phase. Between the two phases, the decision to implement an innovation is made. In the 'initiation' phase, companies explore technological developments, decide how to deal with newly available technologies, search for promising innovations in the business environment, identify problems and needs that can be addressed by using new technologies, and finally consider whether an innovation is appropriate for the company. If this examination is positive and a decision is made to adopt an innovation, the second phase, the 'implementation' phase, follows. Our study focuses on the initiation phase because it is fundamental for later innovation decisions and represents the first important step (Konlechner et al., 2018).

Rogers' (2003) innovation process outlines how companies proceed in examining and implementing innovations. When it comes to examining what enables companies to react to technological developments and what affects companies' responses to innovation, the concept of dynamic capabilities is often used (see e.g., Yeow et al., 2017). Dynamic capabilities are based on the resource-based view of a firm and explain how competitive advantage results from changing value-creating resources. The concept of dynamic capabilities describes the ability of companies to respond to a rapidly changing environment by building, integrating, reconfiguring, and recombining internal and external resources to gain competitive advantage. Teece (2007) disaggregated the dynamic capabilities into three main capabilities of 'sensing', 'seizing' and 'transforming'. 'Sensing' is about how companies identify and evaluate changes and needs, including innovations, to shape new opportunities and avert threats. This is followed by 'seizing', which aims to implement the identified opportunities. Then 'transforming' comes into play, i.e., aligning the organization's assets to ensure long-term profitability. Consequently, sensing capabilities can be linked to the initiation phase of the innovation process, where the main activities are to spot potentially useful innovations and to examine whether these opportunities are suitable for the organization (Rogers, 2003). Dynamic capabilities are constituted by microfoundations that include activities of an organization and individuals. The innovation process is put into action by sensing capabilities and their related microfoundations and activities.

Prior studies have highlighted several microfoundations of dynamic capabilities in the early stages of innovation. These microfoundations have been described in different contexts, like digital transformation (Li et al., 2018; Warner and Wäger, 2019), renewing information technology (IT)-based resources (Queiroz et al., 2018), enacting a digital strategy (Yeow et al., 2017), profiting from innovation (Helfat and Raubitschek, 2018), sustaining competitive advantage in economies with rapid innovation (Teece, 2007;

Teece et al., 2016), achieving sustained value creation (Achtenhagen et al., 2013), leveraging big data to understand customers (Tiefenbacher and Olbrich, 2016), and innovation networks (Rehm et al., 2017).

The microfoundations from the literature can be grouped into two categories. First, those dealing with the identification of technology developments, which was confirmed in almost all papers as a fundamental capability that paves the way for further steps. For example, Warner and Wäger (2019) noted that scanning developments in digital technologies helps organizations respond to changes in dynamic environments. We summarized existing descriptions from the literature into the microfoundation 'Identifying Developments in Digital Technologies'.

The second category comprises microfoundations that address the external environment of a company. In this context, Achtenhagen et al. (2013) noted that "proactively conducting market research is an important activity" (p. 435). This includes analyzing customer preferences (Helfat and Raubitschek, 2018; Li et al., 2018) and customer behavior, which Tiefenbacher and Olbrich (2016) emphasized as increasingly relevant in digital ecosystems. Market monitoring means not only observing customers, but also screening competitors (Helfat and Raubitschek, 2018; Warner and Wäger, 2019) and scanning cooperative ecosystems consisting of suppliers, partners (Rehm et al., 2017), and complementors (Helfat and Raubitschek, 2018; Rehm et al., 2017). For this category, we grouped the findings from previous research into the microfoundation 'Exploring Market Changes and Trends'.

Research Design

We chose a case study approach because we address the question of how companies identify digital innovation opportunities in practice and we want to gain an in-depth understanding of this contemporary and complex phenomenon in a real-life context (Benbasat et al., 1987; Yin, 2018). A multiple-case design was used to increase the generalizability of the results (Benbasat et al., 1987; Bhattacherjee, 2012; Yin, 2018), and because multiple-case designs are also likely to develop a more comprehensive and nuanced interpretation of the relevant phenomena (Bhattacherjee, 2012).

Case Selection

In order to ensure external validity, we applied literal replication logic, i.e., the selected cases have a similar contextual background (Yin, 2018). The considered cases met the following criteria. First, the companies have been engaged in digital innovation projects for many years and have implemented initiatives to foster digital innovation in their organizations. Second, they are active in business areas of the manufacturing industry with more than 10,000 employees, operate internationally, and are headquartered in Germany.

Since we assume that large enterprises are less restricted in their access to resources and capabilities for innovation than small companies (Hewitt-Dundas, 2006), these criteria also fit well with our focus on companies being involved for some time in digital transformation projects. In addition, internationally active companies generally operate in a diverse, complex, and dynamic business environment and must therefore maintain their competitiveness through innovation and flexibility (Zahra et al., 2000). Since the manufacturing industry in Germany has made considerable progress in digitalization in recent years, while digitalization activities in other sectors of the economy have often remained at the same level (Weber et al., 2018), this industry sector fits well into our study. We selected companies headquartered in Germany because it was also important for us to reach key informants at a high decision-making level. The respondents were decision-makers with responsibility for digital transformation or the adoption of digital technologies, for example, Chief Digital Officers (CDO) and Heads of Innovation & Digitalization.

In order to broaden the data basis and to obtain a second perspective, we additionally conducted interviews with consulting firms. This should ensure that we gain insight into the digital innovation activities of companies without internal bias and achieve a higher validity of our results. We interviewed senior and partner level consultants from five management, strategy, and technology consultancies responsible for digital technology strategy projects and large-scale transformation efforts in companies that met our previously described selection criteria.

To identify suitable interviewees, information was collected in advance about the companies and consulting firms, their digitalization projects, and the key informants under consideration. Respondents were recruited through invitation e-mails or by contacting them through professional social networks. A total of

28 people from 21 manufacturing companies and 11 people from eight consulting firms were contacted. At the end, five people from each group were interviewed. An overview of the cases and the respective interviewees is shown in Table 1.

Case	Industry sector	Headcount	Role of Interviewee
M1	Chemicals	> 20,000	CDO
M2	Energy	> 20,000	Corporate Head Digitalization
M3	Mechanical engineering	> 12,000	Manager Digital Innovation Unit
M4	Consumer goods	> 50,000	Corporate Director Data & Application
M5	Pharmaceutical	> 50,000	Manager IT Strategy
C1	Consulting	> 20,000	Partner, technology transformation
C2	Consulting	> 20,000	Partner, technology transformation
C3	Consulting	> 100,000	Director, technology transformation
C4	Consulting	> 100,000	Consultant, technology transformation
C5	Consulting	> 400	Partner, technology transformation

Table 1. Case Overview

Data Collection

For the interviews, we used a semi-structured questionnaire (Gioia et al., 2013) that allowed flexibility in responding to the interviewees' answers and covered all relevant aspects of the microfoundations 'Identifying Developments in Digital Technologies' and 'Exploring Market Changes and Trends'.

The questionnaire started with a general part consisting of questions about, for example, the company, the respondents, their function within the company, and corresponding organizational structures. The second part focused on questions relating to the identification of innovative digital technologies, of market changes, and of internal needs or problems that suggest the consideration of digital innovations. The questionnaire contained open-ended questions so that interviewees could respond in their own words and were not limited to predetermined or preferred terms or phrases (Gioia et al., 2013). A technology management expert supported the development of the questionnaire. In order to ensure that the business perspective was also covered and to check the scope and comprehensibility of the questionnaire, we conducted a pilot interview with the head of a business development department.

The interviews were conducted over a period of five months. Each interviewee was informed in advance about the interview questions and we guaranteed the confidentiality of the answers. On average, the interviews lasted one and a half hours. In order to improve construct validity and to enable data triangulation, we used additional data (Yin, 2018). Supplementary secondary data was collected, such as reports published by the companies, information about (software) tools used, and recent news about digitalization projects (amounting to + 300 pages of documents). All cases were organized in the same way to avoid falsifications and increase reliability. The interviews were digitally recorded, transcribed shortly after the interview, and all data was stored in a case study database (Yin, 2018).

Data Analysis

To provide a quick overview without losing the key information from the interviews, the main points and main statements for each interview were summarized in a brief report at the beginning of the data analysis, together with the interviewers' field notes (Miles and Huberman, 1994).

We followed a directed content analysis approach (Hsieh and Shannon, 2005), i.e., coding was partially deductive and partially inductive (Yin, 2018). All interviews and additional data were reviewed and passages of text that appeared to represent activities related to the microfoundations were coded.

As a pre-set coding scheme, the codes derived from prior theorizing, especially from the microfoundations and the interview template, were used (Miles and Huberman, 1994). When necessary, codes were added during data analysis to match the expressions used by the respondents (Gioia et al., 2013). We derived a collection of first-order concepts that represent detailed information on activities in the early stage of digital technology adoption from our cases and that are connected to the microfoundations from theorizing.

We then performed a second-order analysis in which we examined the first-order concepts for emergent patterns. As part of an iterative approach, the analysis results were repeatedly compared with the microfoundations from the literature (Gioia et al., 2013). An important outcome was an initial understanding of the relationships between the microfoundations and associated activities. Next, we examined whether the second-order themes could be further grouped into aggregate dimensions related to activities for identifying digital innovation opportunities. Figure 1 illustrates a coding example using representative quotes from the cases and the corresponding data structure for the key activity 'Obtain Customer Insights'.

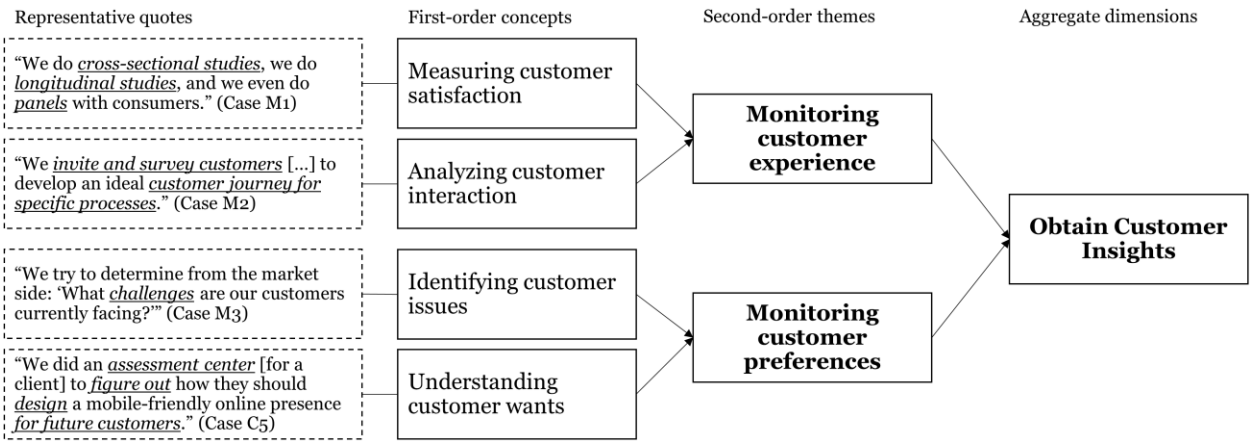

Figure 1. Data Structure for the Key Activity 'Obtain Customer Insights'

The next step was to triangulate the various data for each case to ensure that the results came from more than one source of evidence, but still covered different dimensions of the same phenomenon (Yin, 2018). The data analysis was completed by comparing the cases to each other that contributes to the generalizability (Benbasat et al., 1987). Identifying consistent patterns (Bhattacherjee, 2012) and differences between cases improves the understanding and interpretation of the results (Miles and Huberman, 1994).

Results

The aim of our research is to identify activities to find digital opportunities in the initiation phase of the innovation process. The drivers for adopting digital technologies from the cases reflect that a key capability for digital innovation is a company's ability to gather valuable information about current developments in digital technologies and about changes and trends in the market. This capability confirms the microfoundations 'Identifying Developments in Digital Technologies' and 'Exploring Market Changes and Trends'.

As a result of our research, we found that although companies' motivation for seeking digital innovation may vary, the activities carried out in our cases during the initiation phase of a corresponding innovation process are very similar. We identified seven key activities, which we could assign to the two microfoundations from the literature. All seven key activities are fundamental to the early stage of the innovation process and should be considered as recurring tasks. In addition, it is worth noting that the identified key activities are carried out across functional areas and hierarchies of the companies (cross-functional) or even across organizational boundaries (cross-organizational). The seven key activities are described in detail below and Table 2 provides these key activities with examples from the cases.

Microfoundation: Identifying Developments in Digital Technologies	
Key Activity	**Example**
Identify Technology Trends - 9 cases -	- cross-functional: web crawler to collect information from websites and e-mail newsletters (Case M3) - cross-organizational: impulses from external consultants (Case M4)
Recognize New Applications - all cases -	- cross-functional: internal forums where all employees can participate (Case C1) - cross-organizational: engagement in start-up networks und use of corporate venture capital approaches to operate across corporate boundaries (Case M1)
Relate to Business - all cases -	- cross-functional: assessment of digital technologies and applications twice a year, whether they are suitable as a platform for different business areas (Case M2)
Microfoundation: Exploring Market Changes and Trends	
Key Activity	**Example**
Monitor Business Environment - all cases -	- cross-functional: exploratory market research in relevant industries by a strategic business unit (Case M1) - cross-organizational: using external market observers (Case M4)
Obtain Customer Insights - all cases -	- cross-functional: customer journey management from the pre-purchase phase to sales and after-sales support (Case M2) - cross-organizational: digital platform for collecting customer insights from sales and service partners (Case M3)
Detect Market Trends - 9 cases -	- cross-functional: observing global megatrends (Case M3) and sketching longer-term foresight for periods of "ten years plus" with trend radar methods (Case M1)
Identify Promising Practices - all cases -	- cross-functional: within and cross-industry benchmarking (Case M1) using industry "best practices" from innovative companies (Case C4)

Table 2. Key Activities and Examples from the Cases

Key Activities Supporting the 'Identifying Developments in Digital Technologies'

When companies plan to engage in digital innovation, they first address the following questions: What are the new developments in digital technologies, what are the typical applications for these new technologies, and how might businesses be affected (see e.g., Helfat and Raubitschek, 2018; Queiroz et al., 2018; Teece, 2007; Warner and Wäger, 2019; Yeow et al., 2017)? In our cases, we found three key activities related to these questions: 'Identify Technology Trends', 'Recognize New Applications', and 'Relate to Business'.

Key Activity 'Identify Technology Trends':

We identified the key activity 'Identify Technology Trends' in all manufacturing companies. Furthermore, almost all consulting firms (Case C1, C3, C4, C5) confirmed this activity. In the context of experimenting with new business opportunities, a similar activity was also described by Achtenhagen et al. (2013). Companies are gathering information about digital technologies to identify emerging technical opportunities and trends. For this purpose formal and informal sources were used, such as freely available information (e.g., websites, newsletters), exchange with technology vendors, or cooperations with research institutions and universities. In two of the manufacturing companies (Case M3, M4) it was mentioned that self-developed web crawlers were implemented to collect information more efficiently on websites and from e-mail newsletters. From an organizational point of view, this information collection is often coordinated in technology departments, as observed also by Helfat and Raubitschek (2018).

We found that companies also move off the common path of information gathering and choose innovative approaches. Our interviews showed in seven out of ten cases that it is particularly promising to involve employees from different areas of the company (Case M2, M3, M4, M5, C1, C3, C4). For example, one respondent (Case M4) described: "We have a lot of interested employees and that is the largest sensory

system that we have, a large skin surface over the whole people and when they perceive something, ideally they pass it on to the brain."

Key Activity 'Recognize New Applications'

As a second key activity, we found 'Recognize New Applications'. Here, companies go beyond a purely technology perspective and collect facts about new applications for digital technologies, as also discussed by Queiroz et al. (2018) in the context of renewing IT-based resources. This key activity was present in all cases. In addition to tapping into common sources of information already used to monitor digital technologies, some companies are directly engaging employees. Companies actively promote and monitor internal discussions among employees about interesting applications for digital technologies, for example, through forums such as internal communities of practice (Case M1, M2, C1), internal blogs (Case M4), or communication platforms (Case M1, M3). Sometimes companies even motivate employees to discuss new, technology driven application opportunities in external channels, for example, by using professional social networks across company boundaries. For example, one interviewee (Case M4) stated: "We have now also found that much of our communication about innovation has shifted to LinkedIn. So that's where our people discuss what they think is good, what they think is bad and that's usually public."

To be informed as early as possible about innovative applications and to secure access to them, some companies go far beyond mere data collection and cooperate with start-ups, acquire start-ups, or fund start-ups, as Weiblen and Chesbrough (2015) found for the tech industry. This was particularly emphasized by a consultant (Case C1) who reported his experience with large DAX (German stock index) companies, and by the interviewee from the manufacturing company of Case M1.

Key Activity 'Relate to Business'

As third and final key activity that supports the microfoundation 'Identifying Developments in Digital Technologies', we found 'Relate to Business'. This activity typically follows the identification of digital technologies and related applications and checks, which businesses are affected by the innovations. Yeow et al. (2017) observed this activity in the context of IT alignment with digital strategy. We identified this key activity in all cases. Here, the collected information is contextualized with business criteria to prepare the basis for later decisions on IT investments. Such activities have been identified not only for digital technologies, but also in general processes of technology evolution and innovation (Sood and Tellis, 2005). In most of our studied cases (all of the manufacturing companies and the consultancies C1, C3, C4, C5), technology radar methods (see e.g., Rohrbeck et al., 2006), were mentioned for this purpose. Digital technologies and applications were typically classified in terms of their maturity, potential use in specific business areas, and fit with existing technology platforms.

The classification process itself was often carried out in groups of experts who can evaluate not only from a technical or strategic point of view, but also from an operational perspective (Case M1, M2, M3, M4). This was also confirmed by consulting firms (Case C2, C3, C4).

Key Activities Supporting the 'Exploring Market Changes and Trends'

To identify opportunities through new technologies, a thorough understanding of market developments is essential and must complement the monitoring of new developments in digital technologies. To build a sustainable competitive advantage, it is important to recognize changes in the market environment quickly, ideally always faster than competitors do (Schoemaker et al., 2018; Teece et al., 2016). To ensure this, companies need to implement the corresponding microfoundation 'Exploring Market Changes and Trends' (see e.g., Achtenhagen et al., 2013; Teece et al., 2016), through appropriate activities. In our cases, we found four key activities related to market and customer research: 'Monitor Business Environment', 'Obtain Customer Insights', 'Detect Market Trends', and 'Identify Promising Practices'.

Key Activity 'Monitor Business Environment'

The first identified key activity 'Monitor Business Environment' includes collecting a wide range of information about competitors, suppliers, and government regulations. This activity has also been mentioned by Helfat and Raubitschek (2018) in a research study on innovations in digital platform-based

ecosystems. All of our cases confirmed that a great deal of effort is put into this. Sources of information are, for example, publications of industry associations and market research institutes, annual reports of companies, or announcements of legal changes. There are usually dedicated organizational units (Case M1, M2, M3, M4, M5) for market research, which deal with market developments. In one case (Case M4), it was mentioned that not only is an internal economic team used to prepare market reports, but that in locations where there is only a sales department, additional external market observers are also used to obtain first-hand information about changes in local markets.

Key Activity 'Obtain Customer Insights'

Second, we observed that monitoring the external environment includes another dimension: the customer perspective. Thus, in all cases, we found 'Obtain Customer Insights' as another key activity. In the field of customer relationship management (CRM), Tiefenbacher and Olbrich (2016) noted that customer behavior changes rapidly, especially in digital ecosystems, and companies need to recognize and understand these changes. The interviews show that companies use a variety of methods to identify customer needs and wants, from longitudinal or cross-sectional studies, focus groups, to their own customer research communities. Information from CRM systems or digital channels to customers, for example, from e-commerce systems, is also analyzed. To collect and integrate customer signals from all possible channels beyond company boundaries, including, for example, suppliers, distributors, and service partners, was seen as a major challenge in all of our cases, confirming the discussion in Gimpel et al. (2018).

Key Activity 'Detect Market Trends'

As Battistella and De Toni (2011) noted, for innovation-driven companies, it is not only important to know the "market of today" (p. 1029), i.e., the current situation of an organization, its environment, and changes, but also to have knowledge about possible future developments at an early stage in order to assess what new opportunities and risks may arise. The third key activity we found is 'Detect Market Trends', as also discussed by Teece et al. (2016) for economies with rapid technological change. This key activity was confirmed as an important task in almost all of our interviews (Case M1, M2, M3, M4, M5, C1, C3, C4, C5). The CDO from Case M1 stated on this topic: "We use foresight methods, i.e. 'trend scouting'. So we have this longer-term foresight, which certainly covers periods of 'ten years plus'."

Key Activity 'Identify Promising Practices'

The final key activity we found to explore market changes and trends is 'Identify Promising Practices'. Rehm et al. (2017) identified this activity in the context of innovation networks. We observed it in all cases. The companies' aim is to discover promising use cases that can serve as blueprints for their own business practices. Here companies combine insights about market changes, trends and customer preferences and look how others are trying to leverage them.

For example, in Case M3 increasing interest in augmented reality (AR) applications was noted among customers of consumer goods such as apparel or furniture. Since this company manufactures technical devices where appearance is unimportant to end users, AR systems typical of end-user applications were not seen as beneficial. On the other hand, the company recognized AR applications as a blueprint for using AR to support service partners who perform installations and repairs of the company's products.

However, what is interesting about the four key activities that support the microfoundation 'Exploring Market Changes and Trends' is that the search for market trends and new business practices often extends beyond a company's own industry. In the interviews, it was emphasized that not only information about one's own industry is collected, but that often developments in other markets or ecosystems, for example, in the market environment of partners, are also of interest (Case M1, M3, M5, C4, C5). Some companies even go one step further and enter into strategic partnerships beyond their own industry boundaries in order to gain inspiration and be informed about further developments at an early stage. One respondent (Case M1) commented in this context: "In the past, we have of course not only thought intensively about partnership approaches, but also practiced them. But what we are actually doing differently now than in the past is that we are also living more partnerships across our own industry boundaries."

Concluding Remarks

Digital technologies offer companies opportunities to achieve competitive advantages or to respond to market changes. To meet these challenges, companies need capabilities to adopt digital innovations. We answer recent calls to shed light on how companies develop digital capabilities in practice (see e.g., Verhoef et al., 2021; Vial, 2019). For our research, we combined the innovation process in organizations (Rogers, 2003) with the theory of dynamic capabilities (Teece et al., 1997). Based on the microfoundations of sensing capabilities from the literature, we conducted a multiple-case study that revealed how companies explore promising possibilities for digital innovation in the initiation phase of innovation projects. As a result of our study, we identified seven key activities related to the microfoundations 'Identifying Developments in Digital Technologies' and 'Exploring Market Changes and Trends': 'Identify Technology Trends', 'Recognize New Applications', 'Relate to Business', 'Monitor Business Environment', 'Obtain Customer Insights', 'Detect Market Trends', and 'Identify Promising Practices'.

Overall, our results contribute to the understanding of the intersection of dynamic capabilities and digital innovation, especially digital innovation in companies. This study corroborates the findings of prior research and extends them by systematically identifying and describing the key activities that companies carry out in the early stages of digital technology adoption. Practitioners should consider the described key activities as recurring tasks that are often performed across functions or even across organizations.

However, our research so far only presents key activities for identifying digital innovations. Thus, we look forward to examining subsequent key activities in future research focused on shaping and implementing promising digital innovations.

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