

Building a commercialization capability: A dynamic capability view

Juan Munoz-Penas^{a,b}, Ann Højbjerg Clarke^{a,*}, Majbritt Rostgaard Ewald^a

^a Department of Business and Sustainability, University of Southern Denmark, Universitetsparken 1, 6000 Kolding, Denmark

^b Adhera Health, Spain

ARTICLE INFO

Keywords:

Processual nature of commercialization
Innovation processes
Commercialization capability
Dynamic capability
Organizational processes

ABSTRACT

Firms live and die by their ability to successfully bring innovations to market, which places commercialization as a key capability. Contemporary research suggests that commercialization is a non-linear process with diverse activities and decisions that coincide and interact with the innovation process. By integrating dynamic capabilities as a theoretical lens, this study aims to enhance the understanding of the processual nature of commercialization. Through a longitudinal case study, we investigate how a firm's dynamic capabilities of sensing, seizing and transforming help build its commercialization capability as it changes its offerings from a consultancy to an eHealth service provider. The study contributes to the literature on commercialization by focusing on the organizational processes that lead to a firm's building of a commercialization capability. Four organizational processes are identified: commercial alertness, market context learning, organizational agility and alignment, and credibility building.

1. Introduction

Commercialization is a cornerstone for firms to capitalize on developed products or services (Chiesa & Frattini, 2011; Datta & Reed, 2012). The process of commercializing innovations allows firms to sustain and expand existing markets or create new ones, thereby contributing to sustaining competitive advantages over time (Chiesa & Frattini, 2011; Zahra & Nielsen, 2002). Hence, researchers recognize commercialization as a vital capability (Karaveg, Thawesaengskulthai, & Chandrachai, 2016; Zahra & Nielsen, 2002).

The pathway for commercialization may appear straightforward (Datta, Mukherjee, & Jessup, 2014): the process begins with idea generation and ends with a product or service launch. Nevertheless, what happens during these two points is complex, involving varied and challenging activities and decisions (Schendel & Hill, 2007), and impacts how firms can capture the commercial potential of the product or service and achieve commercialization. Firms may fail due to a poor understanding of the commercialization process (Chiesa & Frattini, 2011) and a lack of ability to handle diverse commercialization challenges such as understanding the customer's perspective, acquiring support from stakeholders, overcoming adoption barriers, and creating credibility for the firm and their innovations (Aarikka-Stenroos & Lehtimäki, 2014; Chiesa & Frattini, 2011; Talke & Hultink, 2010).

Two distinct understandings of commercialization exist in the

literature, where commercialization is deemed a key capability and activity in innovation. First, commercialization is considered a separate and later phase in the innovation process and primarily aims to disseminate the product to the market (e.g. Crawford & Di Benedetto, 2008; Story, Hart, & O'Malley, 2011). In this vein, commercialization has been studied as a new product introduction (Iyer, LaPlaca, & Sharma, 2006), launch (Calantone & Di Benedetto, 2007) or technology introduction (Slater & Mohr, 2006). However, by framing commercialization as a separate phase at the end of an innovation process, there is a tendency to cut research off from understanding how firms, over time, struggle and succeed with commercialization (e.g. Story et al., 2011).

The second understanding of commercialization departs from the above criticism and understands commercialization as a non-linear process that co-exists with diverse activities and decisions during innovation processes (Aarikka-Stenroos, Sandberg, & Lehtimäki, 2014; Wang, Phillips, & Yang, 2021; West & Bogers, 2014). A central part of understanding the processual nature of commercialization is to unfold a solution's commercial potential, which depends on how firms handle activities and decisions related to commercialization during the innovation process (see Prebble, de Wall, & de Groot, 2008; Prenkert, 2012). For example, initial decisions about innovation which concern the market can influence an innovation's commercial success (Markham, 2013). Recognizing that firms' commercialization efforts can be viewed as an ongoing process (Aarikka-Stenroos & Lehtimäki, 2014; Prenkert,

* Corresponding author.

E-mail address: ahc@sam.sdu.dk (A.H. Clarke).

<https://doi.org/10.1016/j.indmarman.2024.01.015>

Received 13 February 2023; Received in revised form 12 January 2024; Accepted 20 January 2024

Available online 25 January 2024

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2012) paves the way for research into the intricacies, challenges and complexities that firms encounter during innovation processes in their effort to capture commercial potential, achieve commercialization (Datta et al., 2014; Schendel & Hill, 2007) and hence retrain a commercialization capability (Karaveg et al., 2016; Zahra & Nielsen, 2002).

To provide a better understanding of the processual nature of commercialization, we integrate dynamic capabilities (DCs) as a theoretical lens. B2B firms, whether market-driven or driving, can benefit by utilizing DCs to sense opportunities and threats, seizing the opportunities, and transforming the firm's resources, processes and structure to better align with or create new markets (Teece, 2007, 2018; Wilden, Gudergan, & Lings, 2019). Firms have to adapt in environments that are uncertain and complex by extending, creating, or modifying their resource position, which involves identifying the need or opportunity to change, formulating a response to such a requirement and implementing the requisite change (Helfat et al., 2007). The three core elements of DCs – sensing, seizing and transforming – are essential for building a future capability (Leemann & Kanbach, 2022; Teece, 2018). DC literature is thus promising for capturing the processual and interactive nature of the commercialization process and paving the way for empirical research on how firms succeed in building a commercialization capability. The research question guiding our research is: *How do firms build a commercialization capability during innovation processes reconfigured by the dynamic capabilities of sensing, seizing and transforming to achieve commercialization?*

To investigate the research question, we conducted a longitudinal case study (2013–2022) of a Spanish firm that succeeded in building a commercialization capability reconfigured by its DCs to capture commercial potential and achieve commercialization. A qualitative longitudinal case study was employed to examine how the phenomena emerged and developed over time (Langley, 1999; Van de Ven, 2007) following how other researchers recommend the investigation of DCs (e.g. Dixon, Meyer, & Day, 2014; Grøgaard, Colman, & Stensaker, 2022). Specifically, our study examines organizational processes the firm goes through in which driving and restraining forces influence the firm in building its commercialization capability during a transition. The transition concerns a shift from the firm's traditional role as a consultancy offering tailored services to becoming a versatile eHealth service provider with a wide range of services integrated through a unified platform.

The study contributes to the commercialization literature in two main ways: first, it contributes by enhancing knowledge of ways firms develop their understanding of how to capture commercial potential and reach commercialization through organizational processes of commercial alertness, market context learning, organizational agility and alignment, and credibility building. Second, the study unfolds the driving and restraining forces in play during firms' building of their commercialization capability and, thus, how firms' internal and external context fosters or hinders this process.

2. Theoretical background

2.1. The processual nature of commercialization

In recent streams of literature, the processual nature of commercialization is emphasized (Datta et al., 2014; Datta & Reed, 2012; Schendel & Hill, 2007; Story et al., 2011) by linking commercialization to diverse activities and decisions created and conducted during innovation processes (Aarikka-Stenroos & Lehtimäki, 2014; Prenkert, 2012). This understanding supplements a prior understanding of commercialization, which highlights commercialization as a separate and later phase in the innovation process and which primarily aims to disseminate a product to the market (e.g. Crawford & Di Benedetto, 2008; Story et al., 2011). A processual understanding allows the study of the activities and decisions firms encounter when capturing commercial

potential and achieving commercialization over time (e.g. Story et al., 2011) by considering that commercialization during innovation processes is about learnings and iterative loops and interactions with diverse stakeholders (Athaide, Meyers, & Wilemon, 1996; Evers, Andersson, & Hannibal, 2012; Hienerth & Lettl, 2011; Nissen, Evald, & Clarke, 2015).

For instance, the processual nature of commercialization includes strategic and tactical decisions, visioning, marketing, implementation and launch. During these activities, interaction with diverse stakeholders (internal and external) plays a central role in capturing commercial potential and obtaining commercialization (Hienerth & Lettl, 2011). Thus, commercialization is characterized by experimenting, learning and iterations (Aarikka-Stenroos & Lehtimäki, 2014). Accordingly, firms' understanding of commercialization begins during market visioning, deciding which concept to develop (Reid & De Brentani, 2012) and the preliminary conceptualization of the business model (Markides, 2006). Through marketing strategy, firms identify competitors, target segments, market positions (Chiesa & Frattini, 2011; Costa, Fontes, & Heitor, 2004; Mora Cortez, Clarke, & Freytag, 2021) and value propositions. Firms' understanding of commercialization further includes tactical decisions such as pricing, distribution channels (Chiesa & Frattini, 2011), market communication (Athaide et al., 1996) and building credibility (Aarikka-Stenroos & Sandberg, 2012). Commercialization is thus considered a continuous and relational process of value co-creation among internal and external stakeholders to create a sustainable position in markets (Aarikka-Stenroos & Lehtimäki, 2014; Alam, 2006; Chiesa & Frattini, 2011; Grönroos & Ravald, 2011; Perks & Riihela, 2004).

The role of internal and external stakeholders is central, as interactions influence how firms come to understand how to commercialize through push and pull market mechanisms (Chiesa & Frattini, 2011). Commercialization is in this article defined as a process with a series of activities and decisions that impact a product and service introduction and market position (Aarikka-Stenroos & Lehtimäki, 2014; Engez & Aarikka-Stenroos, 2023). However, limited empirical knowledge exists about how firms capture commercial potential to achieve commercialization during innovation processes (Aarikka-Stenroos et al., 2014; Datta et al., 2014; Engez & Aarikka-Stenroos, 2023; Wang et al., 2021; West & Bogers, 2014). Therefore, we integrate DC as a theoretical lens into the study, which considers how firms can dynamically extend, create or modify their resource position (Helfat et al., 2007) to form their resource base (Helfat et al., 2007; Teece, Pisano, & Shuen, 1997; Zahra, Sapienza, & Davidsson, 2006), and in doing so build their commercialization capability. We do this as DCs are needed to reconfigure a future capability when firms face shifting and complex environments (Teece, 2020).

2.2. Theory of dynamic capabilities

DCs are considered pivotal for firms to reach and sustain competitive advantages over time (Eisenhardt & Martin, 2000; Helfat et al., 2007; Teece et al., 1997; Zahra et al., 2006). DC theory often refers to the process of achieving superior performance, and its main contribution entails the need for organizations to evolve and achieve an adaptive coherence with the changing environment as responses to the diversity of challenges they face (Helfat et al., 2007). DC 'reflects the speed and degree to which a firm's idiosyncratic resources can be aligned and realigned to match the opportunities and requirements of the business environment while also shaping it' (Katkaló, Pitelis, & Teece, 2010, p. 1178).

Major contributors have pointed to Helfat et al.'s, 2007 definition of DC as the most comprehensive, emphasizing its dynamic nature. Helfat et al.'s definition guides this study. They describe it as: 'the capacity of an organization to purposefully extend, create, or modify its resource base' (Helfat et al., 2007, p. 4), where 'resource base' means an organization's resources, including tangible and intangible human assets and

capabilities. To further explain their understanding of DCs, Helfat et al. (2007) clarify that DCs fulfil three functions: identifying the need or opportunity for change, formulating an answer to such a requirement and implementing change. This does not mean that all DCs serve all three functions; it depends on their different objectives (Helfat et al., 2007), which, based on a widely adopted understanding by Teece (2007, 2018, 2020), are sensing, seizing and transforming (Schilke, Hu, & Helfat, 2018; Leemann & Kanbach, 2022). Moreover, DCs have a dual nature, as they are organizational processes in the most general sense (Ambrosini & Bowman, 2009) and, at the same time, context-specific and deeply integrated within organizations (Helfat & Martin, 2015). As such, firms need to apply DCs gradually and continuously to change the firm’s resource base and, as a result its capabilities. DC scholars often highlight the importance of top management in securing change, as they are central for innovation and addressing the challenges and opportunities firms face (Teece, 2018).

At the heart of DC theory is the perspective that a firm’s adaptive coherence with its evolving environments must be addressed by capabilities at different conceptual levels – both dynamic and ordinary. Each type of capability serves a distinct function (Schilke et al., 2018; Teece, 2018). Ordinary capabilities are part of a firm’s resource base and are directed toward maintaining, operating and leveraging the firm’s current business, product lines, segments and so on (Kachouie, Mavondo, & Sands, 2018; Schilke et al., 2018). These capabilities aim to ‘earn a living in the present’ (Helfat et al., 2007, p. 1), and they pertain to firms’ capacity to effectively utilize both tangible and intangible assets in pursuit of a specific objective (Teece, 2014). Thus, ordinary capabilities are often efficiency-focused processes that occur as part of an organization’s ongoing activity (Newey, Verreyne, & Griffiths, 2012) and can be associated with organizational inertia (Lieberman & Montgomery, 1988). Ordinary capabilities are conceptualized as learned and stable patterns of collective activity through which an organization operates (Helfat & Peteraf, 2009; Zollo & Winter, 2002). In contrast, DCs involve change (Winter, 2003) and are future-oriented capabilities aimed at reconfiguring ordinary capabilities (Ambrosini & Bowman, 2009).

Historically, DC theory has primarily focused on the DC concept itself and how these capabilities relate to external environments. Therefore, scholars have focused less on how DCs reconfigure ordinary capabilities (Schriber & Löwstedt, 2020). Maritan and Peteraf (2007) suggest how this happens, arguing that organizational processes are part of the functioning of DCs – they put DCs into use. The benefits from DCs are thus dependent on the efficacy of the underlying organizational processes that are invoked. Eisenhardt and Martin (2000), among others, go as far as to argue that DCs are processes (see also Ambrosini & Bowman, 2009). The development of new ordinary capabilities (and dynamic capabilities) occurs, according to Zollo and Winter (2002), through organizational learning processes. Thus, as Maritan and Peteraf (2007) argue, there is an inextricable link between dynamic capabilities and the organizational processes that underpin them.

In this article, we take our point of departure in the understanding that DCs manifest themselves in distinct organizational processes employed to adjust and recombine capabilities in a firm’s resource base (Teece, 2018, 2020). The organizational processes enable a firm to function efficiently and effectively. The organizational processes encompass a range of activities and decisions, including search processes for identifying opportunities or needs for change, decision-making processes to determine the best course of action, change management processes to implement these changes and various other processes designed to facilitate the achievement of organizational objectives (Maritan & Peteraf, 2007). These organizational processes help build new capabilities and reconfigure existing ones (Eisenhardt & Martin, 2000) and become most apparent when dealing with conflicts and problems within firms or when they are used (Maritan & Peteraf, 2007). In such instances, these processes can be affected by constraints that hinder progress or drivers of change that enable firms to adapt and thrive.

We integrate a processual understanding of commercialization with existing literature on DCs: DC as a theoretical lens emphasizes the reconfiguring of a firm’s commercialization capability that corresponds with the processual nature of commercialization. We understand commercialization capability as learned and stable patterns of collective activity through which an organization operates (Helfat & Peteraf, 2009), covering activities and decisions that impact a product and service introduction and market positioning (Aarikka-Stenroos & Lehtimäki, 2014; Engez & Aarikka-Stenroos, 2023). By investigating the processual nature of commercialization, we identify how a firm builds its commercialization capability (based on organizational processes connected to the general/idiosyncratic DCs of sensing, seizing and transforming).

3. Methodology: A longitudinal case study

3.1. Research approach and data collection

The research builds on a case study based on longitudinal data, which is particularly suitable when the research aims to follow a complex phenomenon (Orton, 1997; Yin, 2018) that changes and develops over time (Langley, 1999; Van de Ven, 2007). Our longitudinal case study unfolds how a firm that transitioned from consultancy to an eHealth service provider built its commercialization capability reconfigured by the DCs of sensing, seizing and transforming based on two simultaneously occurring and interrelated innovation projects. The firm initiated the two projects to survive and act in uncertain and complex environments. Thus, the longitudinal case study of a single firm’s struggles and successes enabled us to capture critical incidents that twisted or turned the commercialization process and track how the firm exploited its commercial potential to reach commercialization by building its commercialization capability through different organizational processes reconfigured by DCs. The case design also enabled us to observe multiple activities and decisions within the same context, elicit insights from different data and ultimately develop a more holistic and comprehensive empirical account of the focal phenomenon (Eisenhardt, 1989; Yin, 2018).

Following recommendations by Eisenhardt (1989) and Yin (2018), we used multiple sources of evidence. The research approach and the requirement for answering the research question led to data collection based on combining participant observation, a document study and semi-structured interviews (see Table 1). The data were collected during two innovation projects managed by a firm. Both projects were within digital health in cancer (one solution for prevention and another for rehabilitation). The two projects were interrelated, as both were required to build an eHealth platform for various services produced by the two innovation projects, and the two projects were essential for the firm’s transition. Due to the firm’s small size, all its internal human resources were involved in both projects. Accordingly, the two projects allowed us to trace the building of the firm’s commercialization capability reconfigured by DCs, which is particularly relevant for a firm inexperienced in commercializing such offerings.

The events in the multiple data sources occurred over a sustained period (2013–2022), which meant that it was possible for us to collect

Table 1
Multiple sources of evidence.

Methods	Period	Amount of data
Participant observation	2017–2022	>50 external meetings and daily observations inside the firm are reflected in a diary.
Document study of emails	2013–2022	72 email chains showcasing the evolution of specific pertinent topics.
Semi-structured interviews based on a visual timeline	2017–2022	5 interviews with the founder

data over time.

Participant observations were organized from 2017 to 2022 by keeping a diary in which field notes were compiled of what happened, what was said and at what time by whom (Spradley, 2016). Observations were conducted when attending internal and external meetings. The internal meetings happened daily and often addressed commercialization issues between the founder and employees. By actively participating in internal daily meetings and observing the interactions among the internal stakeholders, a single researcher gained valuable insights into the decision-making processes and strategic discussions within the firm. On the other hand, the external meetings gave a comprehensive understanding of the firm's efforts to establish and nurture relationships with potential partners, collaborators, clients, key opinion leaders and investors. The researcher actively observed interactions, discussions and negotiations between external and internal stakeholders. The external meetings surpassed a total of 50. The relationship between the researcher and the firm was founded on a mutual desire to cultivate trust and foster future collaboration. Through the process, both the researcher and the firm's owner immersed themselves in understanding the intricacies and dynamics of the organization. This experience deepened their insights and paved the way for future collaborative endeavors.

The document study of emails enabled the inclusion of data from previous years (2013–2016) and enabled a single researcher to take part in real-time email interactions (2017–2022). Both periods provided insights into former or ongoing discussions and communications between the founder, employees and external stakeholders and helped reveal intentions and deliberations related to the firm's commercialization efforts (Bowen, 2009). The first step in filtering the email inbox was based on the search word 'cancer' (referring to the two projects), which resulted in 3549 emails. The second step involved checking and commenting on the emails in dialogue with the founder over three sessions. If the emails satisfied additional inclusion criteria defined as content representing decisions, situations and knowledge linked to commercialization, they were selected and sorted into email chains, representing the evolution and interactions surrounding a specific relevant topic. In total, 72 email chains were selected for further analysis, totaling 852 emails, thereby facilitating a more nuanced understanding of the events' progression and implications.

Semi-structured interviews were carried out between 2017 and 2022 with the founder to identify incidents that could create a particular twist or turn in the identified commercialization process and to create a narrative explaining the flow of incidents over time (Poole, Van de Ven, Dooley, & Holmes, 2000). A visual timeline was developed to qualify the semi-structured interviews with the founder based on the observations (between 2017 and 2022) and the document study (2013–2022). The founder was selected as an informant, since he led the transition process and had first-hand knowledge of the strategy and commercialization issues to be solved (Schilke et al., 2018). The visual timeline condenses large amounts of information, links and sequences of events. The visual timeline thus helped us to analyze data obtained from the founder due to its ability to represent different dimensions and compare the evolution of the two innovation projects (Langley, 1999). The visual timeline (Fig. 2) is provided in the below data analysis, followed by a description of the critical incidents presenting the findings. We provide quotations from the interviews in the Findings section.

3.2. Presentation of the case

The firm under investigation was founded in 2011 to develop eHealth solutions. eHealth is driving cultural change and a digital revolution in traditional healthcare. It can be defined as 'an emerging field in the intersection of medical informatics, public health, and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development but also a state of

mind, a way of thinking, an attitude, and a commitment to networked, global thinking to improve health care locally, regionally, and worldwide by using information and communication technology' (Eysenbach, 2001, p. 1).

Initially, the firm offered custom-made consultancy services. After two years, due to constant financial difficulties, the firm moved from consultancy to developing and commercializing services based on a software platform. Commercializing an eHealth platform and its solutions differs from consultancy regarding regulations, customer interactions, quality assurance, market knowledge and so on, which challenged the firm to change from business as usual to learning how to exploit commercial potential to achieve commercialization in new ways. The ambition of developing a technology platform and service solutions thus triggered the need for changes in their DCs in the domain of commercialization.

The researchers investigated two innovation projects related to cancer to unveil in what areas the firm faced challenges in changing its resource base and developing a new commercialization capability reconfigured by its DCs of sensing, seizing and transforming. Both projects were strategic for the firm's transition. The first concerned cancer prevention and aimed to commercialize a clinically validated digital therapeutics app to help users quit smoking in combination with pharmacotherapies for smoking cessation. The second project entailed a personalized physical activity coaching app for cancer survivors.

3.3. Data analysis

The data were analyzed to understand the events occurring over a sustained period (2013–2022). The data analysis was inspired by the critical incident technique (CIT) (Burns, Williams, & Maxham, 2000; Roos, 2002) to ensure the quality of the case data and to systematize the analysis and interpretation. CIT is beneficial when analyzing process patterns, since incidents are temporally connected to past as well as expected future incidents (Hedaa & Törnroos, 2008) or might even generate potential new incidents or domino effects (Hertz, 1999) CIT has its origins in Flanagan (1954) and can be described as 'a set of procedures for collecting direct observations of human behavior in such a way as to facilitate their potential usefulness in solving practical problems' (Edvardsson & Roos, 2001, p. 253).

A visual timeline of the two innovation projects was created: first, based on the participant observation data from 2017 and 2022; second, based on the document study (2013–2022) by coding for incidents (Fig. 1, steps 1 and 2). The incidents were mapped and visualized (step 3) by drawing on the five founder interviews. Based on the founder interviews, an understanding of the incidents was further developed, in which deeper knowledge about the links between the incidents and the commercialization activities and decisions involved in these was added. This aligns with the need to identify sequences and temporal patterns within incidents (Van de Ven & Poole, 2005). The trajectories of the different incidents are illustrated in Fig. 2 (is presented in the Findings section), in which the arrows refer to logical connections manifested in the data.

The need to break down the critical incidents into activities and decisions and the driving and restraining forces that unfolded during these made it possible to sort them into different organizational processes (Van de Ven & Poole, 2005). This part was conducted by uncovering activities and decisions in the dataset using a thematic analysis approach (Fig. 1, step 4 and step 5) proposed by Braun and Clarke (2006). They argue for an organic approach to coding and pattern development based on abduction. First, characteristics of DCs based on sensing, seizing and transforming in the existing theory were used as a preliminary list (Fig. 1, step 4). The data were then searched for data-driven activities and decisions, including any driving and restraining forces that played out (Fig. 1, step 5). The thematic analysis allowed us to confront the existing DC theory of sensing, seizing and transforming with activities and decisions within which driving and restraining forces

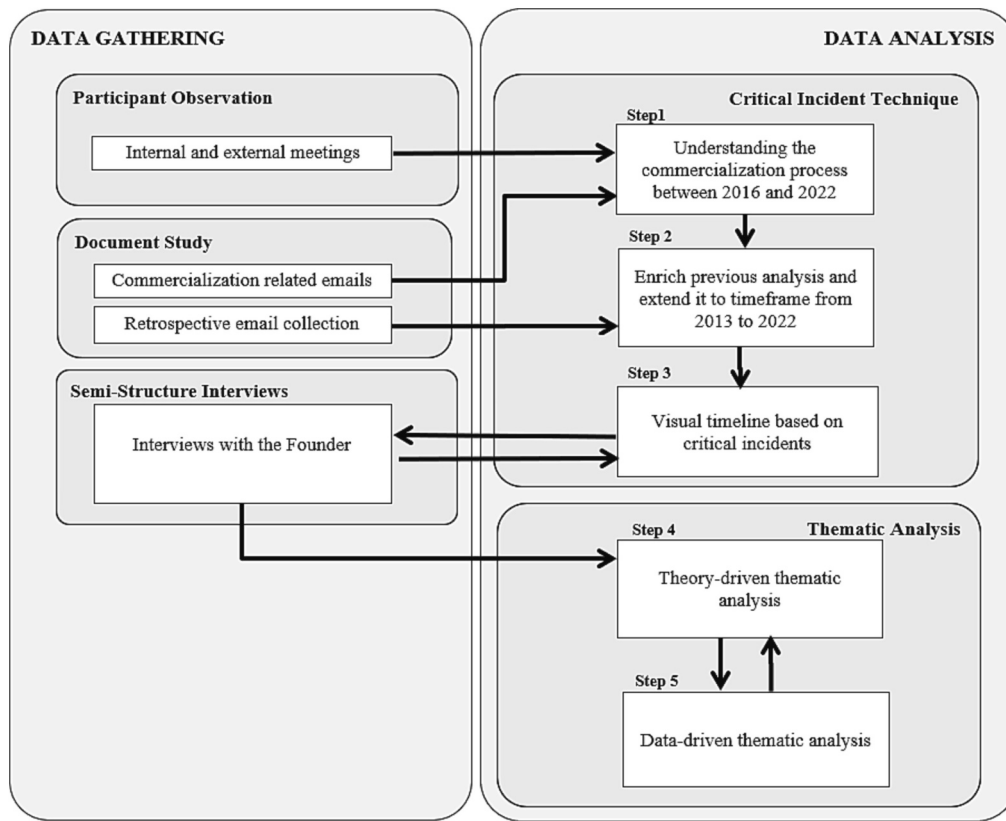


Fig. 1. Data analysis steps.

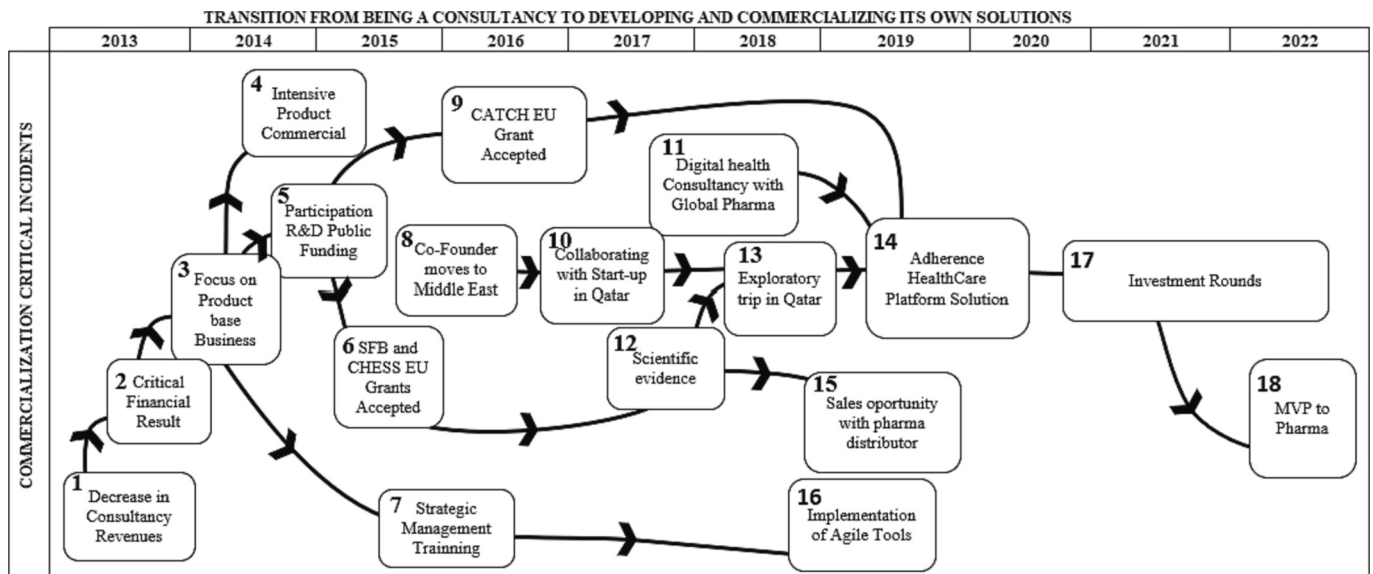


Fig. 2. Critical incidents during the transition period.

were at play during the transition period and categorizing these into four organizational processes connected to building a commercialization capability. Hartley (2004) suggests increasing the validity of the analysis by verifying the findings with participants. As such, the findings were cross-checked and validated by the founder.

4. Findings

In the following, we unfold four organizational processes in which

different activities and decisions take place that help the firm identify the need or opportunity for change, formulate an answer to such a requirement and implement change. To do this, we use the critical incidents from 2013 to 2022, which illustrate activities and decisions and unfold the driving and restraining forces in play when renewing the firm’s commercialization capability. We start by outlining the sequence of critical incidents and thereafter unfold how the firm applied sensing, seizing and transforming through four organizational processes in which driving and restraining forces play a role in building the firm’s

commercialization capability.

4.1. The flow of incidents during the firms' transition period

The firm applied for public funding for R&D projects to enable it to survive and act in uncertain and complex environments. During 2013–2014, the firm experienced a decrease in consultancy revenue (Fig. 2, incident 1), followed by critical financial results (incident 2). Then, the firm attempted to adopt a product-oriented business perspective (incident 3) and intensify its commercial activities (incident 4). However, the firm soon realized the challenges of selling a product that had not yet been developed, which is why it needed financial resources to support the required research and development. Therefore, the firm applied for public funding for R&D (incident 5). The firm received two European R&D funding projects in 2015 (incident 6), which financed research to drive development. In 2016, funding for another European R&D project improved the firm's financial stability (incident 9). In the meantime, the firm sought strategic management training to compensate for its lack of experience and business knowledge (incident 7). Meanwhile, a new work opportunity presented itself to the co-founder, and he moved abroad in 2016 (incident 8) to further develop his technical knowledge and enhance his global vision. This decision resulted in a rich source of knowledge and new network connections and a way to seek visibility and opportunities (incident 10). In 2017, the founder provided consultancy work to a top-five global pharma company (incident 11), and he was immersed in market knowledge and external stakeholder interaction. Meanwhile, the rest of the team was focused on the European R&D grant projects. The projects became central to the firm's daily activities. This resulted in limited possibility for the rest of the team to interact with potential clients until the first clinical trial was completed (incident 12).

After a while, scientific evidence helped boost the solution's credibility, and the firm started presenting the solution to potential clients and investors for launch on a global scale (incident 13). The business pitch was crucial, but regrettably, due to the team's limited experience, they encountered significant hurdles in effectively conveying their business's vision, feasibility, profitability and market fit. Inexperience hindered their ability to articulate a clear and persuasive narrative, causing potential backers to question the team's competence and the venture's viability. Validating the pitch led to considering new value propositions (incident 14). In parallel, the firm started to explore opportunities with a pharma distributor (incident 15). Although the transition from being a consultancy started in 2013, it was not until six years later that agile tools were implemented to align the teams, foster communication and leverage the transition (incident 16). The investment rounds with investors enhanced the last transition (incident 17), which ended with the sales of licenses of the minimum viable product of the platform to potential customers in 2022 (incident 18). The sales of licenses constituted the firm's success with commercialization, the first time the firm sold services based on its technological eHealth platform solutions.

In the following section, we define and elaborate on the four organizational processes and connect them to the critical incidents. We unfold how the firm applied sensing, seizing, and transforming, and additionally, we discuss the core driving and restraining forces that contribute to the building of the firm's commercialization capability.

4.2. Sensing: Organizational process of commercial alertness

Commercial alertness is the process by which a firm becomes aware of and responds to commercial opportunities, encompassing the identification of new market trends, recognition of potential business partners, awareness of beneficial new products or services, understanding competitors' activities, and taking proactive measures to stay ahead in the marketplace. It is a core organizational process dominated by the DC of sensing. In our study commercial alertness allowed the firm to

recognize a commercial opportunity and was central for developing while tackling different commercialization issues surfaced during the development of the two innovation projects. The organizational process of commercial alertness took place over eight years (from 2013 to 2021) and is particularly related to incidents 3, 4, 8, 10, 13, 15 and 17 in Fig. 2.

The driving forces behind the organizational process of commercial alertness (see Fig. 3 below) were most pronounced during the firm's financial crisis and when interactions with external stakeholders were intense (incidents 3, 4, 8, 10, 13, 15 and 17). As the founder explained,

'We knew that we had to leap. We did not have a sustainable business model. We knew it but kept trying to do the same, just better. We were used to working like that. We did not start to change until we internalized the danger we were in – it was a time of great tension in the team, but it allowed us to leap.'

Several changes to the vision, strategy and implementation of the eHealth platform happened as market needs were better comprehended. These changes relate to incidents 13, 15 and 17 (see Fig. 2). Once the firm understood that its commercial alertness required a longer-term view and a more apparent prioritization than the commercialization required for its previous consultancy strategy, it could adapt and build its commercialization capability reconfigured by sensing. This was justified by the founder in this way:

'...in consultancy, you tend to think always in the short term – next project, next proposal. The timeframe is, therefore, much shorter. Global strategy and a larger company force you to think in a horizon of at least 3–5 years. We learned that, at the strategic level, we could not continue on the fly – we had to think of the future.'

The founder's move to the Middle East to search for new knowledge and potential collaborations to create financial stability for the firm (incident 10) is also one of the driving forces in play. The move gave the founder increased insight into market opportunities and commercial potential; the market exposure helped him stay alert. His interpersonal skills and curiosity became an important aspect of developing commercial alertness, as the skills facilitated effective communication and collaboration to identify and capitalize on commercial opportunities. Networking also helped the founder build and maintain relationships and stay informed about new commercial opportunities. Just as crucial was the ability to conduct effective negotiations for securing new business deals and partnerships and conducting teamwork to work well with others for sharing ideas and building trust.

However, restraining forces during the organizational process of commercial alertness were also at play (see Fig. 3 below). The most pronounced was geographical distance (incidents 8, 10, 13 and 14): the founder experienced difficulties transferring and communicating the gained market knowledge to the rest of the firm. Geographical distance also caused employees to interact less with the founder, reduce information sharing and making communicating market knowledge and change challenging. According to the founder:

'I do not stop telling you [the employees] things repeatedly, but I feel I am in another world. You must go outside of the four walls of the company; it is tough for me to make you understand how the market is evolving.'

The founder also experienced communication barriers in the new environment, such as language, cultural or technical difficulties that reduced information sharing and effective collaboration with external healthcare experts, potential customers and investors (incidents 4, 8, 10, 13 and 17).

Moreover, participation in the European R&D project in 2016 (Fig. 2, incident 4) reduced the urgency for change because the financial situation was balanced. This stability changed the team's focus, whereby they paid less attention to market trends and customer needs and gave more attention to fulfilment of the R&D project. The stability provided by the European R&D project created a sense of complacency within the team. The lack of a proactive gathering of market intelligence and staying alert to commercial opportunities limited the organization's ability to adapt and respond to changing customer needs. As a result, the firm may have missed out on leveraging valuable market insights and

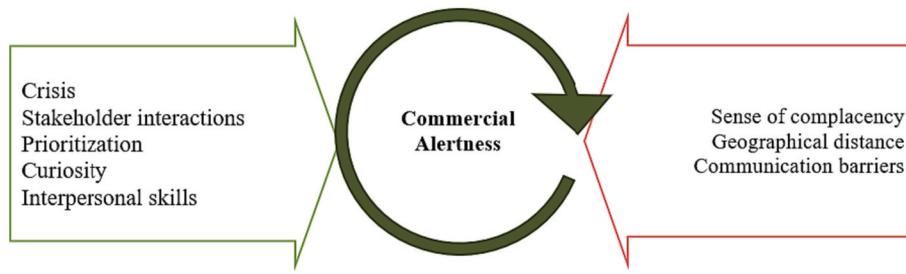


Fig. 3. Organizational process of commercial alertness.

enhancing its competitive advantage.

4.3. Seizing: Organizational process of market context learning

Market context learning is the holistic understanding of how key stakeholders are linked within an ecosystem, often developed through intensive market knowledge interaction, and includes a firm’s identification of potential opportunities and threats. It is a core organizational process dominated by the DC of seizing. In our study, market context learning enabled the firm to make informed decisions on how best to seize opportunities and mitigate the risks associated with threats. Market context learning increased the firm’s seizing of the future and understanding of different stakeholders’ perspectives regarding needs, pains, expectations, and constraints and assisted with informed commercialization strategies. The market context learning in the firm took place over six years (between 2016 and 2022) and is overall related to incidents 8, 10, 13, 14, 17 and 18 (see Fig. 2).

The driving forces behind the organizational process of market context learning based on stakeholder interactions (see Fig. 4 below) were most pronounced during the firm’s transition (between 2016 and 2022). In the early years of the firm’s start-up, the founder insisted that, as a consultancy, the employees needed only limited market knowledge. In contrast, the founder realized that the employees needed to expand their market knowledge and relations with relevant stakeholders during the transition in relation to incidents 8, 10, 14, 17 and 18 (see Fig. 2 above). As the founder explained:

‘The key to acquiring market information has been our openness to learning new things. Here, we enter the personal level, but the openness to learning and the ease of engaging in conversation with other people from other areas has allowed us to build a broad network and support experts who have helped us in the process.’

A shift in the approach to users was also necessary (incident 14) and became one of the driving forces during the firm’s transition. The firm usually applied qualitative research, focus groups, data analytics, usability and co-design to understanding the users’ perspectives. A user-centred design orientation helped bring the user perspective into development. As the founder argued:

‘The patient’s perspective is part of the company. One of the main reasons is that the firm has people on the team with chronic diseases. We can further develop that sensibility abroad, but it is somehow part of our DNA.’

How to approach and understand potential investors also required a change (incident 17). Communication barriers, such as financial jargon, initially hindered building an understanding. However, the founder quickly learned the new jargon as he realized that the pitch to investors needed to include new concerns. The pitch needed to address the long-term strategic vision, deep competitor knowledge, IP strategy, evidence of traction, market potential, scientific evidence and scalability. As the founder reflected:

‘To understand investors, you must speak their jargon [...] and identify their concerns [...]. In the firm, we tend to think about what is urgent and the urgent in the short term, [...] but the vision investors have is much wider in time [...].’

External collaboration and networks were also driving forces that were important for market context learning by providing access to a broader range of perspectives, expertise and information, which helped to validate and strengthen the founder’s analysis and investment strategies for the firm, illustrated by incidents 14, 17 and 18. In addition, internal communication allowed the team to share information, collaborate effectively, foster understanding and improve decision-making. One key aspect of communication in market context learning was the team, as they needed to present commercial strategies clearly and concisely. This included explaining complex product concepts easily and having the ability to listen actively and understand other perspectives to gain a more comprehensive market view (incidents 17 and 18). Including: interdisciplinary knowledge was needed to understand and integrate information and insights from multiple fields or disciplines (incident 8).

Restraining forces during the market context learning organizational process were also at play (see Fig. 4 below). For instance, geographical distance, communication barriers, cultural differences, background differences and uncertainty (Fig. 2, incidents 10, 13 and 17) restrained the organizational processes of market context learning, interfered with the renewal of the commercial capability reconfigured by the DC of seizing.

Geographical distance challenged collaboration and information sharing and challenged gaining a comprehensive view of the market context (incident 8). Cultural differences led to different perspectives and communication styles, making it more difficult to understand and connect with external stakeholders (incidents 10 and 13). Simultaneously, the firm had a tech background and faced challenges in



Fig. 4. Organizational process of market context learning.

collaborating with stakeholders, such as doctors, in the healthcare ecosystem. Differences in background, such as education or experience, led to different perspectives and approaches to market analysis and decision-making. Finally, market uncertainty was also a barrier to understanding the context, derived from complex and dynamic interactions with multiple factors, such as economic, political and social factors. Predicting how these factors influenced market conditions was challenging, making gaining a comprehensive view of the future market difficult. Uncertainty also arose from a need for more information, which made it difficult to understand and predict the potential impact of events and plan accordingly.

4.4. Transforming: Organizational agility and alignment and credibility building

In the following, we divide the DC of transforming into two organizational subprocesses to show that transforming includes a practical dimension and a more normative aspect. The organizational processes of organizational agility and alignment concern how to create a business model that works, whereas the organizational processes of building credibility refer to norms and values that structure choices, emphasizing how things should be done and defining legitimate means to accomplish them.

4.4.1. Organizational process of organizational agility and alignment

Organizational agility and alignment refer to firms' implementation of a flexible business model and commercial strategy combined with managerial and organizational processes to improve a firm's adaptability and responsiveness to market changes. The DC of transforming dominates this organizational process. In our study a key advantage of organizational agility and alignment was that it allowed the firm to exploit new opportunities. Consequently, organizational agility and alignment assisted the firm to avoid potential risks and threats by rapidly responding to market changes and proactively implementing measures to mitigate the negative effects these changes might bring. The organizational process of organizational agility and alignment unfolded over four years (2016–2019) and are overall related to incidents 7, 8, 10, 14 and 16 (see Fig. 2 above).

The driving forces behind the organizational process of organizational agility and alignment (see Fig. 5 below) were most pronounced during the firm's final transition period. For example, the founder introduced tools that allowed reorganizing teams and resources to respond to changes quickly (incident 16). Alignment of the team's roles combined with the ability to reorganize the team according to the task to be solved and the implementation of standards became important drivers for making decisions in an agile manner (see Fig. 5) and are overall related to incidents 7 and 16 (see Fig. 2). The alignment enabled effective communication, coordination and collaboration, which helped decisions to be made quickly and efficiently. In particular, standardization was important for agile decision-making. Standardizing methods, tools and processes provided a framework for mutual understanding, evaluating and measuring performance and progress, which allowed consistent and objective decision-making. Standards provided the team

with a clear, consistent set of criteria to evaluate different options objectively and effectively, ensuring well-informed decisions aligned with the firm's overall strategy. Additionally, the team's responsiveness helped the team to make strategic adjustments (incident 14). Overall, combining more apparent team roles and standards while at the same time becoming more responsive toward the surroundings was a key driving force concerning the firm's ability to change.

External collaboration (incident 10) enhanced the firm's agility by enabling access to internal resources, expertise and knowledge. Collaborating with external partners, guided by implemented standards, allowed the team to quickly recognize the need to access and adopt new technologies, products, services and ideas, facilitating strategic decision-making. Additionally, the collaboration also fostered adaptability and responsiveness to changes. Engaging with diverse partners provided a broader perspective on industry trends and customer needs, aiding in more informed decision-making and action.

Restraining forces were also at play during the organizational process of organizational agility and alignment. Geographical remoteness, resulting from the founder's relocation, reliance on distance communication and lack of daily leadership, hindered the agile feedback loops in decision-making, the orchestration of resources and the progression of actions for the teams (incidents 8 and 10). The initial situation, characterized by a lack of formal decision-making processes, significantly affected operational effectiveness. Eventually, the founder came to realize the need for institutionalizing methods, tools and processes. The founder reflected on this:

'... I am continually exposed to the market, but I struggle to communicate all this knowledge to the rest of the team. When strategic decisions have involved more people in the team, it has taken more time, but they have also been more successful. The problem is when the scenario changes so much that the team does not have time to assimilate the changes and understand the strategy [...] The geographical distance hinder the internal communications and the alignment of the team with the commercial strategy...'

In addition, changing the team's role and implementing standards was difficult (incidents 7 and 16). Inertia and resistance to change were significant barriers to organizational agility and alignment (See Fig. 5). Inertia refers to the team's tendency to maintain established patterns and habits, even when they were no longer effective, making it difficult to adapt to new circumstances and change in alignment with the firm's overall strategy. Resistance to change was evident in the attitude or behavior that opposed change in the firm. The team sometimes knew about the decision but did not know how to make the changes or were uncomfortable and struggled to change. At other times, it was difficult for the team to embrace new ideas, technologies or processes, which impeded decision-making and agility. The team had to understand the firm's goals and objectives to overcome these restraining forces and provide the resources and support needed to adapt to new circumstances. However, in some situations, geographical distance and communication barriers slowed down the response to environmental changes.

4.4.2. Organizational process of credibility building

Credibility building involves developing assets of the firm, brand, or



Fig. 5. Organizational process of organizational agility and alignment.

product/service that lend credibility to communication, thereby establishing trust and confidence essential for initial sales and subsequent scaling. The DC of transforming dominates this organizational process. In our study this was achieved through various means. The firm applied methods like customer testimonials, partnerships, and built a strong success track record in the hope it would attract investors and customers, thereby enhancing the service’s overall value. Credibility building happened for the firm over a five-year period (2017–2022) and is overall related to incidents 12, 13, 14 and 17 (see Fig. 2 above).

The driving forces behind the organizational process of credibility building (see Fig. 6 below) were most pronounced during the firm’s final transition period. To build credibility, the firm used different forms of communication (incidents 12 and 17). Communicating the firm’s achievements through digital channels, published scientific papers and intensive face-to-face communication made the firm’s achievements visible, and credibility could be secured. As the founder stated:

‘Face to face, in a hospital or a pharmaceutical company, being able to give them feedback on clinical research topics related to our technology conveys much confidence [...] We are not medical doctors, but we must talk like them. It is problematic if they perceive you as a mere technological provider.’

Moreover, social networks were used to raise awareness of achievements, which provided access to specialized media, press notes or being invited to conferences (incident 12). These communication channels secured credibility and facilitated access to targeted stakeholders. Personal branding, firm’s CV and effective communication using scientific evidence and professional jargon facilitated interpretability and credibility when communicating with health professionals and investors.

Restraining forces were also at play during the organizational process of credibility building. The small size of the firm and the lack of previous experience were perceived as restraining forces in credibility building. The firms size raised concerns among customers, investors and partners, who were hesitant to trust a small firm in terms of its stability, capability and ability to deliver on promises. The perception of limited resources and expertise hindered the firm’s effort to build credibility. Moreover, the absence of a proven track record played a crucial role since it cast doubts on the firm’s ability to deliver products successfully. External stakeholders were skeptical about the firm’s capacity to meet their needs, overcome potential challenges and deliver satisfactory results.

5. Concluding discussion

Drawing on a contemporary perspective on commercialization that emphasizes the processual nature (e.g. Story et al., 2011) and the coexistence of non-linear activities and decisions during innovation processes (Aarikka-Stenroos et al., 2014; Wang et al., 2021; West & Bogers, 2014), this study provides a comprehensive understanding of how a firm captured the commercial potential to achieve commercialization over a transition period from 2013 to 2022. Notably, the findings offer an improved theoretical understanding of the complexities involved in commercialization (Schendel & Hill, 2007). Specifically, we

identified four organizational processes in which a firm renewed its commercialization capability reconfigured by the DCs of sensing, seizing and transforming. The organizational processes support the firm’s transition; these include commercial alertness, market context learning, organizational agility and alignment, and credibility building. All four organizational processes were present throughout the main parts of the transition the firm went through, showing that the DCs of sensing, seizing and transforming are intertwined processes that may impact on each other and, through iteration, support the reflections, learnings and cognitive understandings of a firm’s managers and employees and help them come to realize how to capture the commercial potential to reach commercialization.

The study’s longitudinal focus shows that reconfiguring a firm’s commercialization capability is not linear. Rather, the four organizational processes in which the firm sensed, seized, and transformed were conducted iteratively and interacted with each other over an extended period. Consequently, building a firm’s commercialization capability reconfigured by DCs is not a one-time event. It requires adaptation and refinement based on continuous market feedback and internal alignment. Over time, this iterative approach becomes routinized, leading to a deeper understanding of how to capture commercial potential to achieve commercialization, resulting in the building of a commercialization capability. Specifically, the process of sensing, seizing and transforming unfolded gradually over time and, as is typical for the management in smaller firms (Adner & Helfat, 2003; Schilke et al., 2018), centred around the founder before it became embedded in the employees. In this case, the firm’s commercialization capability was reconfigured as the founder and the employees developed their skills and expanded their capacity to shift from a short-sighted to a long-term outlook. Along the way, they acquired an understanding of the language used by key external stakeholders and learned how to establish a solid market foundation for the firm’s products.

The study also shows that the process of sensing, seizing and transforming is not without challenges. Driving and restraining forces were at play during the change, hindering or supporting the firm (founder and employee) in renewing the firm’s commercialization capability reconfigured by DCs. Internal and external contexts created the driving and restraining forces underpinning the four organizational processes. Drivers included crises, financial difficulties, geographical proximity to stakeholders, interactions within specialized networks and restraining forces, which included geographical distance, limited organizational resources and a lack of experience. These forces impacted the renewal and alteration of the firm’s resource base, organizational structure and decision-making processes. For instance, the manager’s cognitive understanding without active involvement from the firm prevented the employees from acting, thus impeding the transition process. This initial delay affected knowledge transfer, decision-making, cultural and structural changes, and the adoption of new tools. However, interaction with the market and external stakeholders ultimately contributes to learning and accumulating insights and knowledge, which triggers the renewal of the firm’s commercialization capability through iterative learning processes. Recognizing the firm’s shortcomings in capturing commercial potential and achieving commercialization serves as a

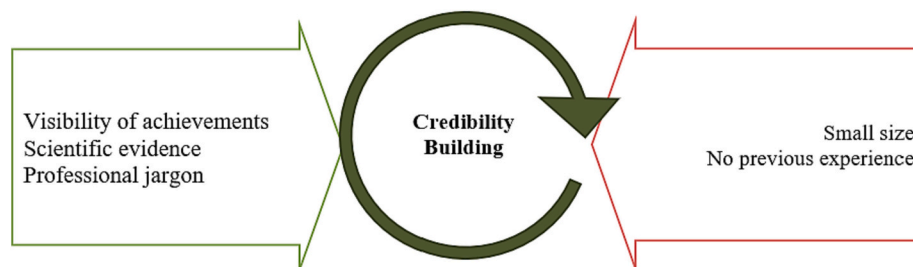


Fig. 6. Organizational process of credibility building.

driving force for change. Market knowledge interaction plays a significant role in this process.

5.1. Theoretical implications

In contemporary academic discourse, scholars increasingly perceive commercialization as an ongoing process rather than the final stage of innovation. This evolving perspective highlights the need for a deeper understanding of a commercial capability, its development, and the underlying organization processes spurring its change. Our study provides insights into these aspects, shedding light on the complexity of developing a commercialization capability and the processes that support this change. Three theoretical implications are important to pinpoint:

First, this study contributes to commercialization literature by identifying the underlying organizational processes for building a commercialization capability in the form of commercial alertness, market context learning, organizational agility and alignment, and credibility building. Commercial alertness, market context learning and credibility building are consistent with findings in other studies (Aarikka-Stenroos & Lehtimäki, 2014; Engez & Aarikka-Stenroos, 2023). These studies highlight core challenges and activities involved in commercialization, including choosing a strategy in uncertain conditions, understanding customer benefits, establishing credibility, gaining stakeholder and ecosystem support, overcoming adoption barriers and generating sales. By focusing on the changes spurred by various organizational processes in which DCs are utilized, it becomes possible to unfold the change process a firm goes through. This process establishes how a firm's resource base and organization are restructured to reconfigure its commercialization capability, including the organizational process of enhancing organizational agility and alignment.

Second, our study shows the critical role a manager's cognitive development plays in a smaller firm's transition. This is done by focusing on organizational processes where internal and external contexts either foster or hinder a firm's transition. This finding aligns with Schilke et al. (2018), Teece (2018) and Wilden et al. (2019), as they emphasize the criticality in the importance of a manager's ability to balance the DC of sensing with seizing and transforming. As typical in smaller firms, the manager is critical for the employee's resources and knowledge to change, and thus for the organizational structure and culture to be renewed during the process (Adner & Helfat, 2003; Schilke et al., 2018). In building commercialization capability, this involves integrating organizational agility and alignment, characterized by implementing a flexible business model and commercial strategy to enhance adaptation and quickly responding to market change. However, this poses a challenge in smaller firms where the manager is absent from the daily operations thereby impeding a gradually and continuously change to the firm's resource base and its capabilities through its employees and activities.

Third, our study reinforces the ideas provided by Teece et al. (1997) that DC learning involves 'a process by which repetition and experimentation enable tasks to be performed better and quicker' (Teece et al., 1997, p. 520). This statement suggests that iterations and learning play a significant part in the development of DCs (Evers et al., 2012), and that learning processes must be considered a critical mechanism in DC development (Zollo & Winter, 2002). Our longitudinal study advances the current understanding by demonstrating that renewing commercialization capability reconfigured by the DCs of sensing, seizing and transforming is not a linear process where one DC comes before the other. Rather, it is an iterative and intertwined process that, in some periods, is dominated more by one than the other. This further aligns with the idea of early market experiment in the innovation process (e.g. Lynn, Morone, & Paulson, 1996) because early experiments may be a significant primary resource and source of driving forces.

5.2. Managerial implications

A central managerial implication is for firms to acknowledge commercialization's processual and relational nature. Managers, particularly founders of smaller firms, who are aiming to build and renew a commercialization capability should concentrate on the four key organizational processes: commercial alertness, market context learning, organizational agility and adaptation, and credibility building. These processes are not independent but are intertwined and configured by the DCs of sensing, seizing and transforming. Commercial alertness and market context learning help firms sense and seize market shifts and customer needs. Organizational agility and adaptation are core to transforming and capitalizing on opportunities and implementing organizational action and plans. Building credibility is equally important in a transition, adding credibility to a firm's commercial endeavors. By understanding and integrating these organizational processes, managers can better navigate the complexities of commercialization, making their firms more adaptable and competitive in rapidly changing markets.

Another managerial implication concerns that continuous learning and stakeholder engagement are essential for value co-creation and capability development. Building commercialization capability is not a linear process, and as such iterative learning and experimentation is needed. Managers need to customize their strategies to suit the specific needs and dynamics of their business environment. This includes being flexible and responsive to market changes and internal capabilities. Specifically, the study highlights the critical role of the founder, emphasizing their responsibility to recognize the challenges of communicating market knowledge within the firm and alignment of the team with the commercial strategy. It emphasizes the importance of establishing structures and processes that broadly foster an understanding of customers' needs and preferences broader in the innovation team and organization.

5.3. Limitations and future research

Analyzing the building of a commercialization capability reconfigured by DCs is challenging. Consequently, data were gathered longitudinally, which is a limitation of this study. However, this increased the possibility of observing how a capability was changed and built. Nevertheless, due to the complexity of the organizational processes in play the research covers only a single firm, which represents one of the study's limitations. Further studies are required to better understand and account for the firm's size, the context and the forces in play. For instance, the geographical distance obstructing the alignment between the founder and the team in our study might be an idiosyncrasy of the case.

Analyzing the organizational processes based on the DCs of sensing, seizing and transforming, including the driving and restraining forces in play, has allowed us to obtain preliminary insights into the activities and decisions behind the change of the commercialization capability. Insights into these activities and decisions show the need to focus on learning and unlearning. Currently, DC researchers tend to focus on the importance of learning as a mechanism for developing DCs and thus tend to ignore the potential influence of unlearning, which can interfere with the application of new knowledge (Navarro & Moya, 2005). Restraining forces identified in our study (e.g., inertia, change resistance, or mistakes) make it evident that considering unlearning as an additional mechanism in building a commercialization capability is essential. Some studies propose unlearning as a previous stage of learning (Becker, 2010; Navarro & Moya, 2005), others as a type of learning (Antonacopoulou, 2009) such as learning from failure (Baumard & Starbuck, 2005; Zhao, 2011). Even though unlearning is challenging to unravel empirically (Tsang, 2008), our study suggest that learning and unlearning are highly interdependent and pinpoint that the development and renewal of capabilities might happen through the "co-evolution of multi-level learning processes across different learning arenas and organizational

levels” (Tran, Zahra, & Hughes, 2019, p. 126).

Funding

This work was supported by the CATCH - Cancer: Activating Technology for Connected Health, grant number 722012, funded by the European Union Horizon 2020 research and innovation programme.

CRediT authorship contribution statement

Juan Munoz-Penas: Conceptualization, Data curation, Formal analysis, Investigation, Project administration, Software, Visualization, Writing – original draft. **Ann Højbjerg Clarke:** Conceptualization, Funding acquisition, Investigation, Resources, Supervision, Validation, Writing – review & editing. **Majbritt Rostgaard Evald:** Conceptualization, Funding acquisition, Methodology, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing.

Declaration of competing interest

None.

Data availability

The authors do not have permission to share data.

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