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Embracing the “fail fast and learn fast” mindset: conceptualizing learning from failure in knowledge-intensive SMEs

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Abstract “Fail fast and learn fast” is a principle commonly advanced to quickly grow and scale start-ups and SMEs. However, the literature lacks detailed insights into how such learning is organized. The paper aims to investigate how knowledge-intensive SMEs learn from failures through organizational learning processes. To answer this question, we present in-depth case studies of three SMEs that operate in a dynamic context where quick adaption to changes, failures, and learning are natural modes of practice. Our findings present the learning from the failure process, which includes three phases: (1) failure recognition, (2) interactive sensemaking, and (3)

organizational adaptation. We condense our insights into a framework disentangling how SMEs succeed and fail and how they can learn from failures through their underlying learning processes. We contribute to prior literature on organizational learning in SMEs by focusing on knowledge-intensive SMEs and practices that enable effective learning from failures.

Plain English Summary The “fail fast and learn fast” mindset provides an opportunity for an organization not only to experiment, make mistakes, and fail but also to learn from this experience and use it for future success. However, research has not yet managed to provide detailed insights into how such learning can best be organized and facilitated. In this article, we investigate how knowledge-intensive SMEs learn from failures through organizational learning processes. We show that SMEs should strive to learn from failure and that this learning can be organized over three phases: failure recognition, interactive sensemaking, and organizational adaptation; each with underlying sub-activities and principles. We contribute to prior literature on organizational learning by focusing on knowledge-intensive SMEs and describing practices that enable effective learning from failure. We also provide insights for managers on how to facilitate rapid learning from failure in their knowledge-intensive SMEs.

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1 Introduction

“Mistakes are to be made. But it is about what you are going to do about them, how you handle them. So, how we handle them is figuring out what we can do in the best possible way, at the given moment, with the given resources and everything else. So, it is never a one-person thing. We are all now in this situation, so let’s figure out what to do. This is how we manage and pivot very fast. [CEO of knowledge-intensive SME Gamecorp reflecting on its way of doing business]”

“Fail fast and learn fast” is a business principle commonly used to quickly grow and scale start-ups and small and medium-sized enterprises (SMEs) by embracing failure as a crucial element in the learning process. Failure is defined as a departure from the desired results and goals of the firm (e.g., Dahlin et al., 2018; Rasmussen, 1982; Sitkin, 1992). Embracing failure is an inherent characteristic of a fail fast and learn fast mindset in which firms allow their employees to fail, to learn from failure, and to reconfigure their organizations accordingly (McGrath, 2011). Embracing the fail fast mindset signals an understanding that different kinds of failure (Friend et al., 2019), ranging from partial to complete failure, can serve as a vital trigger for sensemaking and learning, as well as for pivoting from the planned strategy or business model (Weick et al., 2005). We argue that a fail fast approach is particularly important for knowledge-intensive SMEs operating in dynamic, fast-changing markets, where constant learning, innovation, renewal, and adaption to market changes are critical for survival (Alvesson, 1995; Edmondson, 2011; Khanna et al., 2016; McGrath, 2011). For instance, failure to enter a certain market during the early stages of SME development can trigger sensemaking and a revised response so that the product and

services are repositioned toward a more profitable market segment.

We build on the organizational learning literature (e.g., Argote & Miron-Spektor, 2011; Argote et al., 2021; Crossan et al., 1999), which extols the importance of studying processes and practices related to learning from failure. Based on that, we define learning from failure as an *organizational process by which individuals, groups, and organizations recognize failure events, analyze such events to find their causes, and search for and institutionalize solutions to prevent similar failures in the future*. Nevertheless, learning from failure is a complex and challenging endeavor. For example, failure can demotivate, lead to conflicts, and create a negative reputation in a company, which may hinder sensemaking and learning in organizations. Thus, there is a need for a better understanding of the processes of learning from failure while embracing the fail fast mindset. In this study, we seek to conceptualize the process of learning from failure, drawing on insights from the literature and case studies of knowledge-intensive SMEs to provide a framework that sheds light on how SMEs can systematically embrace “fail fast and learn fast” as a catalyst for learning and improvement. Following this background, we identify and contribute to two research gaps.

First, prior studies of learning from failure have focused almost exclusively on learning from complete and detrimental failures (e.g., Cope, 2011; Mayr et al., 2021; Politis & Gabrielsson, 2009). The problem with such a perspective is that “understanding of learning becomes limited to two performance extremes—extreme success and failure—while most organizational experience falls somewhere in the middle” (Kim & Miner, 2007, p. 688). In this study, we propose that both failures and minor failures provide important learning opportunities for firms. Thus, we view failure to be on a spectrum from complete to partial failure, which allows for a nuanced view of how to view and conceptualize failure. In particular, minor failures may serve as a knowledge source that provides answers to problems and determines which behavior to emulate or to avoid. They can encourage a company to look for new activities and offer a chance to develop novel business strategies or business models (Kim & Miner, 2007; Miner et al., 1996). Hence, a need exists *to understand a more nuanced perspective on failure*.

Second, previous studies have given too little attention to the practices and routines that are fundamental to the process of learning from failure. Only recently, a limited number of empirical studies have started to explore learning from minor failures in experimentation, focusing on large firms and a context such as B2B sales and R&D (Friend et al., 2019, 2020; Khanna et al., 2016). Other rare studies examine innovations as the outcome of learning from failures, in which an “intelligent failure mentality” is being embraced and encouraged (Friend et al., 2020, p. 113). However, these studies discuss specific mindsets to be applied in exploratory work in R&D and are not primarily focused on the organizational learning processes (e.g., Crossan et al., 1999), especially those of knowledge-intensive SMEs. In fact, to the best of our knowledge, no studies have explicitly defined practices associated with organizational learning from failure in SMEs. At the same time, most studies on learning in SMEs assess the role of knowledge creation and transfer processes on task performance, while the research stream dealing with learning from failure experiences is under-researched (see, e.g., Haunschild & Rhee, 2004; Baum & Dahlin, 2007; Madsen & Desai, 2010; Desai, 2015). This paucity of knowledge is especially important since knowledge-intensive SMEs operate in failure-ridden, dynamic contexts driven by constant change, turbulence, and a need for learning and innovation. Accordingly, we argue that knowledge-intensive SMEs provide an ideal setting to study learning from failure. Thus, there is a *need for a more processual understanding of how knowledge-intensive SMEs can learn from failures*.

To address these gaps, the study investigates *how knowledge-intensive SMEs learn from failures through organizational learning processes*. With this study, we challenge the ongoing debate about whether firms indeed learn from failure (see e.g., Bennett & Snyder, 2017; Park et al., 2023). We build on in-depth case studies of three knowledge-intensive SMEs and 42 interviews. These SMEs operate in a highly dynamic context where quick adaptation to changes, failures, and learning are natural modes of practice. Our findings are summarized in the learning from failure process, which includes three phases, each with its underlying sub-activities and principles. Phases include (1) failure recognition, (2) interactive sensemaking, and (3) organization reconfiguration.

Thus, this study contributes to prior literature on organizational learning in SMEs by explicitly focusing on knowledge-intensive SMEs and their “fail fast and learn fast” mentality.

2 Theoretical background

This study seeks to contribute to an increased understanding of how organizations, specifically SMEs, learn from failure. To do so, we build on the concept and literature of organizational learning (Argote & Miron-Spektor, 2011; Argote et al., 2021; Crossan et al., 1999), as a promising perspective to increase understanding of the processes and practices of learning from failure in knowledge-intensive SMEs. Drawing on the literature on organizational learning and learning from failure (e.g., Crossan et al., 1999; Dahlin et al., 2018; Edmondson, 2011), we define learning from failure as *organizational processes by which individuals, groups, and organizations recognize failure events, analyze such events to find their causes, and search for and institutionalize solutions to prevent similar failures in the future*.

Building on Crossan et al.’s (1999) foundational work on learning processes, we suggest that learning from failure may build on four sub-processes: *intuiting failures*, *interpreting failures*, *integrating the lessons learned*, and *institutionalizing the corrective action*. Learning from failure is about consciously *intuiting failures*—for example, recognizing and recording failure in everyday activities (Edmondson, 2011; McGrath, 2011). Yet, the literature lacks detailed insights into how such recognition happens—in other words, how organizations find, evaluate, and conceptualize the failure. *Interpreting failures* means the creation of an understanding of the underlying patterns in failure cases by analyzing the failure and its causes (Crossan et al., 1999; Edmondson, 2011). For example, interpreting, sharing, and discussing the failure with team members and trying to make sense of its underlying dimensions, means, and the wisdom that it brings are crucial for learning (Cannon & Edmondson, 2005). Thus, the interpretation of the failure is verbalized to understand what has occurred. *Integrating the lessons learned* (Crossan et al., 1999) requires failures to be socially constructed, analyzed, and learning to be integrated into the company. Integration consists of the development

of a shared understanding through dialogue, mutual adjustments, and jointly coordinated actions, which are important for learning (Crossan et al., 1999). *Institutionalizing the corrective action* is central to implementing the lessons learned through the organization, as a part of its systems, structures, procedures, and strategies (Crossan et al., 1999). For example, it relates to changing an organizational process to ensure that a failure will not happen again (Dahlin et al., 2018).

To further advance this research agenda and contribute to organizational learning literature, we conducted a literature review. Table 1 presents the main results of a selected group of journal articles that deal with learning from failure. Our review shows that this literature is still quite nascent, and there has been a limited systematic examination of the processes of learning from failure. Specifically, we detected only a small amount of conceptual and empirical studies being undertaken on the topic and even fewer focusing on SMEs. However, this emerging literature offers several important insights and segments of knowledge.

There is a different conceptualization of failure, which may hinder the advancement of the literature on learning from failure. For example, failure has been studied with different connotations, such as being negatively perceived as a termination of a business (e.g., Politis & Gabrielsson, 2009), a firm's bankruptcy (e.g., Mayr et al., 2021), the end of a business relationship (e.g., Arino & De la Torre, 1998), failure in experimentation (Khanna et al., 2016), and more positively as "intelligent failures" (McGrath, 2011; Sitkin, 1992), ranging from partial to complete failures. Since we are interested in organizational learning from failure, we are not focused on venture failure (e.g., bankruptcy). We are also not focused on skill-based errors (such as mistakes during routine actions), or rule-based errors (deliberate deviations from rules) that can lead to failure (Reason, 1990). Instead, we are focused on learning from failures that appear as an outcome of errors of judgment in the face of uncertainty. This includes, for instance, knowledge-based errors (Reason, 1990)—problem-solving activities that turn out to be wrong even though the decision maker believed them to be correct at the time. We also focus on minor and intelligent failures, especially those related to failures in innovation activities (see e.g., Rhaiem & Halilem,

2023). They can include different organizational processes as well as human actions (e.g., Ramanujam & Goodman, 2003) and, therefore, provide an important learning opportunity (Dahlin et al., 2018; Edmondson, 2011; Friend et al., 2019).

Learning from failure has multiple benefits, as discussed in the literature. Failure triggers sensemaking, learning, and constant organizational adaptation (Weick et al., 2005), which is an essential part of a firm's productivity and survival. As Edmondson (2011, p. 16) argues: "Those that catch, correct, and learn from failure before others do will succeed. Those that wallow in the blame game will not." Learned lessons can serve as a knowledge source on what to avoid in the future, they can bring solutions to similar challenges, and they can provide the space to develop different business strategies (Kim & Miner, 2007; Miner & Haunschild, 1995; Miner et al., 1996). Other studies have described the benefits of learning from failure as wake-up calls that bring insights into practices that do not work well, that demonstrate behaviors to avoid, or offer templates that a firm can employ to address similar issues in the future (e.g., Kim & Miner, 2007; Miner et al., 1996). Moreover, lessons from failures are beneficial for modifying organizational practices in order to improve the performance of the firm in the long run (Dahlin et al., 2018). Furthermore, failure is considered a crucial part of experimenting and innovating, which leads to first-hand experience, and it is helpful for the firm experiencing it, as well as for others (Cope, 2011; Mayr et al., 2021). Indeed, recent literature suggests that embracing failure early on is the main source of learning and the basis for developing a fail fast and learn fast mindset (Friend et al., 2019, 2020; Khanna et al., 2016; McGrath, 2011).

We also find relatively little empirical evidence on the processes of learning from failure. While some studies claim a processual perspective on learning from failure, we find no study that clearly delineates the phases and core activities of learning from failure processes. For example, the study by Kim & Miner (2007) explored learning from near-failure and failure experiences of other banks, as important components in failure-related learning. Eftekhari & Timmermans (2022) focused on learning from the closure of a business while re-entering into entrepreneurship in the setting of a new venture. Similarly, Lin & Wang (2019) examined reventure speed after a

Table 1 Selected studies on learning from failures

Authors, year, and journal	Study type and sample	Key findings on learning from failures	Comparison to the present study
Sitkin (1992), <i>Research in Organisational Behaviour</i>	Conceptual paper	The paper focuses on learning from “intelligent failures,” which are “small and relatively harmless failures most effective in fostering learning...” Failure is perceived to be an essential prerequisite for learning	Lack of focus on SMEs and no empirical data
Arino & De la Torre (1998), <i>Organization Science</i>	Qualitative study of 2 MNCs	Focuses on learning from an alliance failure, i.e., the end of a business relationship, which can be caused by “(1) initial conditions that are inconsistent with economic efficiency requirements or which hamper learning; (2) environmental changes that modify the efficiency or equity conditions to a non-remediable degree; or (3) a breach in performance...”	Failure is negatively perceived as the termination of a B2B relationship, lacking the focus on SMEs
McGrath (1999), <i>Academy of Management Review</i>	Conceptual paper	Failure is perceived as the termination of a firm’s business, the outcome of failed goals, or performance below a certain critical threshold	Lack of the process view, no focus on SMEs
Ramanujam & Goodman (2003), <i>Journal of Organizational Behavior</i>	Conceptual paper	The paper developed a new concept of latent errors and defined it as “uncorrected deviations from procedures and policies that have no direct adverse consequences.” Based on their view, “all organizations become potential objects of study in research on errors.”	Lack of focus on SMEs and no empirical data
Thornhill & Amit (2003), <i>Organization Science</i>	A quantitative study of 339 corporate bankruptcies	Focus on a failure as a firm’s bankruptcy “... failure among younger firms may be attributable to deficiencies in managerial knowledge and financial management abilities. Failure among older firms... may be attributable to an inability to adapt to environmental change.”	Lack of process view, not focusing on SMEs, negative perception of the failure
Cannon & Edmondson (2005), <i>Long Range Planning</i>	Practice-oriented paper	“Reframing failure from something associated with shame and weakness to something associated with risk, uncertainty and improvement is a critical first step on the learning journey.”	Lack of focus on SMEs, no primary data analysis
Kim & Miner (2007), <i>Academy of Management Journal</i>	A mixed-method study within the banking industry	Their results indicate that “start-ups can learn from the real-time experience of others.” Also, the near-failure experience of firms from the same industry generates “stronger survival-enhancing learning” than a failure of those firms	Focus on learning from others’ failures and near-failures
Politis & Gabrielsson (2009), <i>International J. of Entrepreneurial Behavior & Res</i>	Quantitative study on 231 entrepreneurs	Entrepreneurial learning is understood as an experiential process. Entrepreneurs have different attitudes toward failure. Failure is understood as a termination of a firm	Failure is negatively perceived as termination of a business

Table 1 (continued)

Authors, year, and journal	Study type and sample	Key findings on learning from failures	Comparison to the present study
Cope (2011), <i>Journal of Business Venturing</i>	A qualitative study of 8 SME representatives	Learning is future oriented. Learning from failure can prepare the entrepreneur for the next business endeavor. Failure is perceived as a damaging experience, although it can benefit learning	Failure is negatively perceived
Edmondson (2011), <i>Harvard Business Review</i>	Practice-oriented paper	Managers have a perception that failures will create a careless work environment, where mistakes will multiply. "This common worry should be replaced by a new paradigm—one that recognizes the inevitability of failure in today's complex work organizations. Those that catch, correct, and learn from failure before others do will succeed. Those that wallow in the blame game will not."	Lack of focus on SMEs, a lack of strong theoretical examination of the phenomenon, and no primary data analysis
McGrath (2011), <i>Harvard Business Review</i>	Practice-oriented paper	"A certain amount of failure can help you keep your options open, find out what doesn't work, create the conditions to attract resources and attention, make room for new leaders, and develop intuition and skill. The key to reaping these benefits is to foster 'intelligent failure' throughout your organization."	Lack of focus on SMEs, a lack of strong theoretical examination of the phenomenon, and no primary data analysis
Khanna et al. (2016), <i>Academy of Management Journal</i>	Mixed-method study, analysis of 97 patent expirations and interviews	The paper focuses on learning from small failures in experimentation, i.e., failed innovation attempts. Failure is perceived as an integral part of exploratory learning	Lack of focus on SMEs, different empirical contexts
Dahlin et al. (2018), <i>Academy of Management Annals</i>	Literature review paper	The paper reviewed the literature on learning from failure and error and identified three learning mechanisms: opportunity to learn, motivation to learn, and ability to learn	Lack of focus on SMEs and no empirical data
Friend et al. (2019), <i>Industrial Marketing Management</i>	Mixed-method study, interviews with 70 employees, 297 surveys	"...this research explains the phenomenon of failing fast within a business-to-business sales context. The authors theoretically conceptualize and operationalize a failing fast process model."	Lack of focus on SMEs, different empirical contexts
Lin & Wang (2019), <i>Small Business Economics</i>	A quantitative study of 268 entrepreneurs located in China	The study focuses on the relationship between the age of an entrepreneur and the time between a previous business failure and a new venture (i.e., reventure)	Failure is perceived as a business closure. The focus is on reventuring
Friend et al. (2020), <i>Industrial Marketing Management</i>	Quantitative study of 274 B2B sales managers	"Fail fast strategy helps salespeople preserve their scarce resources for high potential opportunities. Fail fast strategy also celebrates an intelligent failure mentality."	Lack of focus on SMEs, different empirical context

Table 1 (continued)

Authors, year, and journal	Study type and sample	Key findings on learning from failures	Comparison to the present study
Mayr et al. (2021), <i>Journal of Small Business & Entrepreneurship</i>	A quantitative study of 102 corporate bankruptcies	Failure is considered a firm's bankruptcy, and it is argued to be dependent on the knowledge and qualifications of its entrepreneurs	Failure is negatively perceived, a lack of process view
Eftekhari & Timmermans (2022), <i>Small Business Economics</i>	A quantitative study of 2400 team-based Danish SMEs	The paper focuses on “how learning from failure takes place in the setting of new venture teams” when the business that they were involved with closes (e.g., goes bankrupt)	The focus is on reentering into entrepreneurship and learning from the failure of a business
Rhaimem & Halilem (2023), <i>Technological Forecasting & Social Change</i>	A quantitative study of 436 Canadian manufacturing SMEs	The study focuses on learning from innovation failure by focusing on: “organisational (problem-solving and blaming approaches and psychological safety), interactional (trust among employees), and individual factors (personal mastery).”	A lack of process view

business closure, in relation to the age of the entrepreneur, arguing that older entrepreneurs need more time to start a new venture (i.e., reventure), compared to younger entrepreneurs. However, these studies did not conceptualize the actual process of learning, its steps, or its outcomes. In addition, the study by Friend et al. (2019) focused on the process of learning from an individual salesperson's failure (e.g., rejection by a customer) in large firms. Although it relates to learning from “intelligent failures” and encourages the fail fast mindset, the study focuses on the sales process only. This represents a limited view when examining start-ups and SMEs because of their limited resources (where a single person has several roles) and fast-changing environments, where novel challenges occur almost daily. Overall, while these nascent studies indicated a positive outcome from learning from failure, they did not conceptualize a processual view on learning from failure in SMEs, especially knowledge-intensive SMEs in a highly dynamic and fast-paced market context.

To summarize, our review of the literature on organizational learning and learning from failure synthesizes extant knowledge from diverse streams of research. Gaps exist in knowledge regarding the composition and nature of learning from failure processes, their phases, and activities. Hence, a greater understanding is needed on how knowledge-intensive SMEs learn from failures through organizational learning processes.

3 Methodology

This study aims to investigate how knowledge-intensive SMEs learn from failures through organizational learning processes. To address this aim and generate theoretical insights from empirical data, the study implements a qualitative, in-depth, case study approach (Eisenhardt, 1989; Yin, 1994) of three knowledge-intensive SMEs combined with inductive reasoning (e.g., Corley & Gioia, 2004; Eisenhardt & Graebner, 2007). This approach is deemed appropriate due to an unexplored phenomenon (Creswell & Poth, 2016). We deliberately selected knowledge-intensive SMEs as a domain of study as they differ significantly from capital- or labor-intensive companies. Those SMEs heavily rely on the experience and learning of their workers, as they do not have the

recruiting capacity that large firms have. Oftentimes, their employees are highly educated and professional, and the firm depends on their loyalty because losing them would result in the loss of their acquired knowledge (Alvesson, 1995, p. 6). The critical factors of knowledge-intensive SMEs include people, networks, relationships, and services, while traditional tangible assets or resources are often not a priority. Instead, those SMEs focus on the retention of accumulated knowledge and the exploration of ways to share it (Prichard et al., 2000, p. 3). In addition, knowledge-intensive SMEs need to continuously innovate to keep up with the demand of turbulent markets. However, since innovative activities are often challenging for SMEs due to their limited resources (Barbaroux, 2014), they frequently encounter and, in consequence, learn from small failures.

3.1 Case sample and data collection

The cases used in the study were selected purposefully, to illustrate different viewpoints on the phenomenon and to provide validity to the empirical findings (Creswell & Poth, 2016). The case selection was motivated by several factors. First, all three companies are knowledge-intensive SMEs operating in a B2B sector (see Table 2). Accordingly, the cases exhibited a strong dependence on internal knowledge and learning from their activities and outputs as a source of competitive advantage. Second, the selected cases operate in dynamic industries (medtech, gaming, and drone inspection) characterized by uncertainty, constant change, and high risk/occurrence of failure. Third, we consciously selected companies that are innovative frontrunners in their respective fields and who could communicate a strategy to provide more knowledge-intensive offerings and adopt an innovation-oriented approach. For example, their founders encourage novel ideas and outside the box thinking, which is reflected in the companies experimenting, trying new things, and orienting toward innovation. As a result, the selected SMEs regularly confronted failure in their business. Fourth, the selected SMEs prioritize learning and openly discuss failures in their internal organization. For example, Robotcorp described its emphasis on solving complex problems by innovating, being creative, actively exploring different solutions, and learning from its own and others' failures. Finally, the researchers

established personal relationships with companies and key informants, which facilitated access to rich data.

The primary data was collected through 42 semi-structured interviews with CEOs, owners, and operational and business development managers of the case companies. Since the researchers have a close connection with the SMEs, interviews were collected throughout the years of collaboration, and open discussions on failures were encouraged. Companies discussed various intelligent failures and knowledge-based errors, and it is from this pool that representative examples were chosen. For instance, over the years, Robotcorp experimented with product, service, and system combinations and innovations; faced challenges with passive board members who did not participate in the development of new ideas; understood from mistakes of a bad hire; and figured out what customers were willing to pay for. Gamecorp experimented with the pre-charging of projects and different pricing combinations, learned from mistakes in setting up deadlines, explored different negotiation strategies with bigger clients, and learned from bad hires. MedTechcorp experimented with different B2B platforms, experienced challenges between team members, made mistakes with different internationalization strategies, and faced challenges with the development of new innovations. All this resulted in the opportunity to collect sensitive data on failures, which were useful in portraying the underlying aspects of the organizational learning processes. In addition, semi-structured interviews with open-ended questions enabled respondents to freely share their stories and narratives without pre-set limitations (Creswell & Poth, 2016). The interview guide included broad themes, such as organizational learning processes, learning from failure, and the influence of learning on organizational practices (see Appendix). The interviews were conducted in English, and the duration of each interview was, on average, 45 min. A case study database, containing all available documents related to empirical data is available to all researchers.

3.2 Data analysis

A grounded theory approach was used to analyze data (Gioia et al., 2013). We followed Eisenhardt & Graebner's (2007, p. 25) reasoning: "The theory-building

Table 2 Description of the primary data

Company (size)	Short description	COO and year of foundation	No. of employees	Revenue 2021	No. of interviews
<i>MedTechcorp</i> (medium-sized)	B2B SME, with partners worldwide, providing innovative MedTech solutions	Finland, 2009	44	4.1 mil €	11
<i>Gamecorp</i> (small)	This SME operates in both B2B and B2C sectors, focusing on game development, eLearning, and consulting	Finland, 2017	17	150,000 €	15
<i>Robotcorp</i> (micro)	B2B SME that provides cutting-edge technology for drone inspection of inaccessible areas and advanced data analytics	Sweden, 2019	5	120,000 €	16

process occurs via recursive cycling among the case data, emerging theory, and later, extant literature.” Thus, we conducted simultaneous interpretation and comparison of the interview transcripts, emerging concepts, and existing literature (see also, Goulding, 2005). In coding the data, we followed three steps (see Fig. 1): (1) open coding of interview data, followed by axial coding to develop first-order categories; (2) creating second-order themes by iterating between literature, data, and previous coding; and (3) generating aggregate dimensions by examining the connection between second-order themes. During the coding process, the researchers discussed their findings and focused on the interpretation of similarities and differences between the produced codes. Transcripts and final codes were checked several times to ensure that data was correctly interpreted (Lincoln & Guba, 1985). Very minor intercoder differences were discussed in the team and reassessed, when necessary, to reach intercoder reliability (Hayes & Krippendorff, 2007).

4 Findings

This section presents the findings that emerged inductively. In explaining how knowledge-intensive SMEs engage in learning from failure, this study defines phases and core activities in a process for learning from failure (see Fig. 1). Our data analysis identified three phases of the learning from failure process, each with underlying sub-activities and principles: (1) failure recognition, (2) interactive sensemaking, and (3) organizational adaptation. Table 3 presents representative quotations for the

analysis. After describing the phases separately, a process framework specifying the interrelationships among the aggregated dimensions and themes is presented.

Next, we provide separate sections for each phase.

4.1 Phase 1: Failure recognition

Naturally, the first phase of learning from failures is failure recognition. This relates to the ability and mindset to detect and recognize failure so that it can be dealt with and similar issues avoided in the future. In this domain, we identify two sub-activities: *failure identification* and *embracing failures*.

As our informants stated, the learning processes begin with the *identification of a failure*. This requires openness to identify not only failures in current internal business activities but also past failures and even competitors’ failures that provide learning experiences. As our data show, a key trigger for failure identification is active monitoring of business performance deviations, which facilitates the identification of internal failures that entrepreneurs or their team members experienced recently. For example, Gamecorp described the monitoring of everyday business activities and interactions with current and potential clients as a way of identifying failures: “The only way to learn is together: we must talk, identify our failures, figure them out, and next time do estimations together.” A common theme was that interaction with customers (e.g., a difficult pitch for a novel value proposition) was a critical point for failure identification. Similarly, the representative of MedTechcorp mentioned the importance of using team meetings to monitor and identify potential failures as a way of

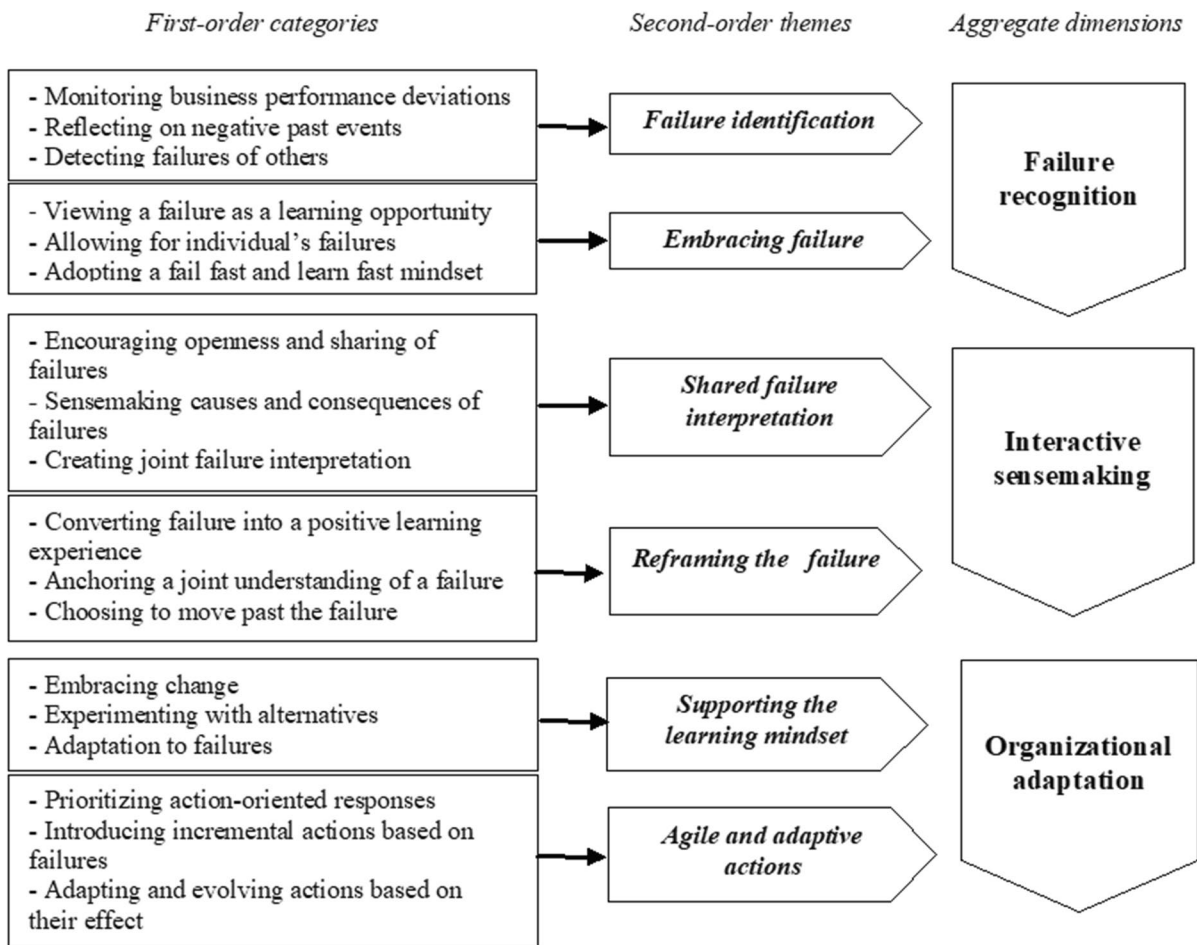


Fig. 1 Data structure

instilling a mindset of active improvement of business performance on a micro-level. In addition, many informants mentioned reflecting on negative past events and experiences as a basic principle of failure identification in the current enterprise. For example, Gamecorp's CEO constantly reminded herself of bad experiences from leadership in prior employment as a guide to understanding how to avoid making the same mistake: "What we did with our company is based on our bad experiences with leadership from before. So, if we are creating our own company, we want to avoid past failures by reflecting on those events." Detecting the failures of others can trigger failure recognition by illuminating mistakes of competitors, business partners, colleagues, or simply, other companies in the market and internalizing the learning. For example, the CEO of Robotcorp described how a conversation

with an industry competitor sparked the realization of a critical mistake they were currently committing that could lead to failure. The experience sparked an internal learning process:

"One company from Stockholm, which was doing a similar thing as we did, reported bankruptcy in December. Last week, I had a conversation with their CEO who is now searching for a new job. He said that they just invested too much in the development, while not having enough customers to cover all those costs. They were trying to grow organically, so they didn't take many investments, and so on, which now I'm trying to push."

Another critical factor underlying learning from failure recognition is *embracing failure*. This relates

Table 3 Exemplary empirical quotes for second-order themes

Aggregate dimensions	2nd-order themes	Representative quotes
Failure recognition	Failure identification	<p>Monitoring business performance deviations: “It is crucial to detect any possible deviations in our performances. That allows us to identify mistakes and avoid failure in time.” Robotcorp</p> <p>Reflecting on negative past events: “After recognizing that mistake, the CEO was the one pulling the break and ending the project. Now, when thinking of it, it was a good call to avoid more damage.” MedTechcorp</p> <p>Detecting failures of others: “We have a really close relationship with other companies in Finland and abroad. So, our software and game development networks are consisting of friends and colleagues from the industry. And we get to hear the stories and see a lot of mistakes that others from the industry are doing or issues that they are faced with.” Gamecorp</p>
	Embracing failure	<p>Viewing a failure as a learning opportunity: “When we are anxious about making mistakes and learning from them, this creates some risks, and the productivity is hampered. My advice is to try to promote the kind of environment where it’s always okay to make mistakes, as long as you take accountability for them, and you actually define what went wrong. And implement some processes that will prevent them from happening again. Take them as something you learn from.” MedTechcorp</p> <p>Allowing for individual’s failures: “People need to understand that they are not alone. Usually, in companies, people are pointing fingers at each other, blaming whose fault it is. Doesn’t matter whose fault it is!” Gamecorp</p> <p>Adopting a fail fast and learn fast mindset: “For me, the most important is how my employees think, if they have an open mind, if they like to experiment with different algorithms, and learn continuously but fast, through every small failure they encounter.” Robotcorp</p>
Interactive sensemaking	Shared failure interpretation	<p>Encouraging openness and sharing of failures: “We would need better communication and openness in our teams, even mid-term wrap-ups to really have an honest discussion of what we think is not serving us anymore, and so on.” MedTechcorp</p> <p>Sensemaking causes and consequences of failures: “Together with my small team, we try to talk about our own as well as competitors’ failures and what were the causes and consequences of those.” Robotcorp</p> <p>Creating joint failure interpretation: “We are not being afraid to say when we have some issues and interpret failures as a team. The point of teamwork is that it’s not an issue. We shuffle things among ourselves to make sure that everything goes forward.” Gamecorp</p>
	Reframing the failure	<p>Converting failure into a positive learning experience: “My approach now is even if I’m making failures, I’m focusing on learning, and I don’t regret anything. Because, at the time when I was making the decision, I would say, it was the best decision I could make at the time with that knowledge.” Robotcorp</p> <p>Anchoring a joint understanding of failure: “We failed to interpret this failure together, as the CEO stopped the project, and we moved on to a different software.” MedTechcorp</p> <p>Choosing to move past the failure: “After interpreting the competitor’s failure, we decided to go in three different directions to balance the income.” Robotcorp</p>

Table 3 (continued)

Aggregate dimensions	2nd-order themes	Representative quotes
Organizational adaptation	Supporting the learning mindset	<p>Embracing change: “This learning opened my eyes about what else, as a team leader, I need to consider. Or how to approach different angles and embrace change, not just in team management, but in making sure how people work together.” Gamecorp</p> <p>Experimenting with alternatives: “We have these learning sessions from time to time, where we have been trying out some fun new software and being encouraged to experiment. It’s really fun to do that, and people are always very positively triggered after these sessions.” MedTechcorp</p> <p>Adaptation to failures: “I had to take the decision to simplify the process and our offer. I’m so happy because this enables us to work with the customers much quicker, to perform the job, and to get their feedback.” Robotcorp</p>
	Agile and adaptive actions	<p>Prioritizing action-oriented responses: “We use our learning to take actions, i.e., to improve products, services, as well as processes – especially processes. Now as we are growing, that is the most important. Also, all these processes must be based on individual people’s learning, instead of having a process just for the sake of a process. We are adjusting processes, not just to fit the company’s strategy, but to fit people as well.” Gamecorp</p> <p>Introducing incremental actions based on failures: “Learning should be a rolling process, based on incremental changes and actions.... It is more like learning on the micro-level – you don’t even realize that it happened, as those were little incremental changes accumulated over time.” MedTechcorp</p> <p>Adapting and evolving actions based on their effect: “The employee also took his initiative to create some standards and protocols on how we develop the software, how we create, how we arrange it, how we report issues, and so on – for the new employees – to make it easier to keep it organized. I saw this as a very, very positive action.” Robotcorp</p>

to not viewing failures as something to be avoided but rather focusing on viewing them as a learning process. For example, the CEO of MedTechcorp succinctly described: “I think failures are the best teachers. Accept them as something you learn from.” On the contrary, several informants argued that when company culture and individuals are not embracing failures as learning opportunities, this creates different risks for the company (e.g., hampers creativity, stalls decision making) and constrains productivity. In addition, our respondents stated that it is crucial to avoid blaming individuals for failures because, ultimately, what matters is to focus on recognizing and dealing with a failure rather than spending time interrogating whose fault it was. For example, the CEOs we talked to commonly discussed distancing failure from individual responsibility (including themselves)

and adopting a more unbiased view of the failure. Finally, it is important to adopt and maintain a fail fast and learn fast mindset in the team and the whole company. The CEO of Gamecorp described how they had been trying to implement this mindset in the company:

“Mistakes will be made, no matter what, but letting your team members experience those mistakes and learn from them first-hand is priceless.”

4.2 Phase 2: Interactive sensemaking

The second phase of learning from failure refers to interactive sensemaking, which relates to the process of failure interpretation and meaning giving. In this

domain, we identify two sub-activities: *shared failure interpretation* and *reframing the failure*.

As our data shows, after the failure recognition phase, the learning process continues with the *shared failure interpretation*, which results in mutual understanding of the issues and brings strength to the team and the ability to achieve interactive sensemaking. This process requires the team leader to focus on encouraging openness and the sharing of failures. For instance, an employee at Gamecorp contended that transparency, communication, listening, and sharing of failures are crucial factors to consider after recognizing the failure. Once failures have been acknowledged, the next step involves making sense of the causes and consequences of failures. As the CEO of Robotcorp noted: “We are analyzing all the failures in a group... That is definitely learning at its best.” This allows team members to analyze and discuss why a failure has happened and form a novel understanding of potential sub-causes of why something occurred. Finally, after failures have been evaluated in a team setting, the important next step relates to creating joint failure interpretation. This requires openness among team members and the ability to share their sensemaking and understanding of each failure and its causes so that it can be avoided in the future. When team members are not afraid to discuss their failures and come to a mutual interpretation, a foundation for learning is created, which can save the company from failure in the future. However, when that is not the case, the learning is hindered, as underscored by the representative from MedTechcorp:

“When mutual understanding and interpretation of a failure is not present, it complicates and hinders the learning process and development of new ideas.”

The second theme of interactive sensemaking refers to reframing the failure. The first principle relates to converting the failure into a positive learning experience. As the representative of Gamecorp intimates, when she recognizes a small failure, she tries to take the maximum learning from the experience and convert the failure into something that will benefit her team and the company in the future. The next step refers to anchoring a joint understanding of that failure. As the CEO of Robotcorp argues:

“It is extremely important for me to get opinions from my team, get their feedback and opinion

on the failure that occurred... get a sense of what they are thinking. We also listen to our customers about what they would like us to improve in the future. So, we want to address those struggles.”

At the end of this process, the final step is choosing to move past the failure. In other words, what are the next steps that the team and the company itself should focus on? As Robotcorp’s CEO explains, after converting failures into positive learning, he decided to move on in three different directions to balance the future income of his SME. In the case of Gamecorp, *giving meaning to failures* ensured that they will not be repeated:

“Co-founders and I took the responsibility of learning and implementing practices to avoid the same mistake in the future. We want to make sure, not just what works the best for us, but for the people who work for us – and ultimately, how can we move forward from where we are now.”

4.3 Phase 3: Organizational adaptation

The third phase relates to organizational adaptation, which involves taking action to implement modifications and changes to existing processes inside a company, with the aim of improving future activities based on learning from failures. This phase consists of two sub-activities: *supporting the learning mindset* and *agile and adaptive actions*.

As our respondents argue, after interactive sensemaking and figuring out how to move forward, the company needs to focus on *supporting the learning mindset*. In essence, this means exploring what steps should be taken next to resolve the failures that occurred and improve the company. This involves embracing change by accepting the failures and learning from them through feedback from the team and partners and reflecting on the process rather than simply moving on. For example, the manager from MedTechcorp argued for the need for wrap-ups and honest team discussions to recognize what is beneficial for the company and what is not and to embrace the change that results from a specific failure. The next step is to experiment with alternatives related to organizational adaptation. Evidently, respondents

love to try different things, test different new processes, and see what functions are best for the team. For example, Robotcorp described experimenting with different value propositions after a failed market engagement with a customer. The representative from Gamecorp asserted: “As technologies are constantly developing, what we really love doing is to try different things. We can try one thing, if it doesn’t work, let’s try another one. This flexibility and experimenting with alternatives are also strengthening the team so much.” Finally, adaptation to failure is a crucial factor. It has to do with staying open-minded about new learning and exploring new opportunities for organizational adaptation. For example, the CEO of MedTechcorp argued for the importance of constantly supporting the learning mindset when faced with failure: “...because the only way to learn and go beyond where we are is to test new practices and adapt to challenges coming our way.”

The second sub-activity of organizational adaptation relates to *agile and adaptive actions*. This prioritizes action-oriented responses, which lead to the actual implementation of those improvements and change processes in an SME. For example, Robotcorp uses its learning to make improvements in products, services, and different internal processes, such as recruitment. At the same time, the respondent from MedTechcorp argued that it is important to introduce incremental changes and actions to internal resources and processes in SMEs that are based on recognized failures. Finally, by experiencing failures, SMEs can adapt and develop actions faster with each new experience. As Gamecorp’s CEO intimated, the company learned much from making the mistake of not securing steady payments in one of its first projects. By learning from this small failure, it is now able to create detailed contracts that secure each team member’s responsibility and pay, so that work can be continued without monetary interruptions.

4.4 A process framework for learning from failure

Based on the inductive analysis, this article proposes a process model with detailed activities that enable effective learning from failures. It aims to explain how knowledge-intensive SMEs can leverage failures as points of learning—that is, routinize the fail fast and learn fast mindset while operating in

dynamic business environments. The Gamecorp CEO explained the context and why learning from failure is critical:

“The gaming industry is growing as an industry, in addition to constant technology and software development. Everything goes so fast. In this kind of industry, it is crucial to keep learning constantly, to keep up with all the newest trends, trying out the newest technologies, exploring what is possible with different technologies. So, basically, constant learning from failures is the key to coping in this dynamic environment!”

Whereas Fig. 1 reports the structure of the data, Fig. 2 depicts the relationships among the emerging constructs to create a process view on learning from failure in SMEs. The model is grounded in the phases identified in our analysis: *failure recognition (Phase 1)*, *interactive sensemaking (Phase 2)*, and *organizational adaptation (Phase 3)*. It adds different activities conducted by individuals and teams to ensure progression from one phase to another (see Fig. 2) to achieve the outcome, which is organizational learning.

According to the process model, learning refers to the process of recognizing and interpreting failures and adapting accordingly in order to create, retain, and transfer the learning outcomes within the SME. In the initial phase (Phase 1), the learning process starts when an individual or a team recognizes the failure. In this phase, it is crucial to focus on identifying a failure and acknowledging it is something worth learning from. As shown in our findings, there are different ways of identifying failure—either your own or others—but the key elements are to internalize the failure, embrace it as a catalyst for the learning process, allow for individual’s failures, and adopt a fail fast and learn fast mindset that welcomes failure. Only when this has been accomplished can one move to Phase 2 on interactive sensemaking. Interaction denotes the involvement of others, which means the failure can be interpreted through different lenses and its potential causes and consequences detected. To progress with learning, team members need to be able to interpret their experiences openly in the team by explaining what has happened to themselves and others. Once the team comes to a joint interpretation and shared understanding of the failure, the process can turn to reframing the meaning of failure and choosing

to move past the failure, incorporating the lessons learned along the way. As the process unfolds, Phase 3 occurs through organizational adaptation. First, the team needs to explore adaptation opportunities by embracing change, examining all the alternatives, and adapting to new perspectives that come from the failure, while remaining agile and responsive to a reconfiguration of internal resources and processes that are now needed. This final phase of the learning process ensures that the change occurs through specific adaptive and evolving actions so that similar failures are avoided in the future.

The desired outcome will be accomplished, and the learning will be successful when the SME has initiated essential improvements in internal practices and when learning outcomes are embedded into the organizational structure, processes, and strategy. On the contrary, in the absence of such adaptations, the learning will be unsuccessful. For the former, the SME will be able to avoid similar failures in the future. In the latter case, the SME might face the repetition of similar mistakes, which could ultimately lead to its bankruptcy. Finally, if learning from failure is successful, it will strengthen the emphasis on a fail fast and learn fast culture within the firm, where failures are encouraged and celebrated as learning opportunities. As our results indicate, the more SMEs practice learning from failure, the more resilient they will become in turbulent environments, where they face daily challenges. In consequence, they will adopt more constructive postures when facing failure, rather than being mired in negative thinking. In other words,

learning from failure is an ongoing process and after the learning from one failure has been completed, the firm returns to Stage 1, identifies new failures, and embarks on the next learning journey. This denotes continuity and learning from failure as a process in which every step forward is empowered by the firm’s culture—one that cultivates learning from failure.

Our findings illustrate the vital importance of learning from failure as an engine for firm renewal, innovation, and business model refinement. To illustrate this point, Table 4 presents examples of learning-from-failure processes and outcomes from case companies. As these examples illustrate, an organization’s mindset and proficiency in achieving key activities over the phases largely determine the outcome in terms of learning from failure. More specifically, in our analysis of the different companies’ mindsets and learning outcomes, we revealed that successful learning requires embracing a fail fast and learn fast mindset. By consciously focusing on learning from failure, SMEs can avoid catastrophic outcomes in the future and, ultimately, a business closure. However, this learning should be continuous and included as an ongoing element of SME practices and activities that underline the organizational learning process. A board member at Robotcorp described how a fail fast learning oriented culture was evident in the way they operate:

“You know these guys... I am actually quite impressed with how they hustle, learn, and reinvent themselves. They have gone through sev-

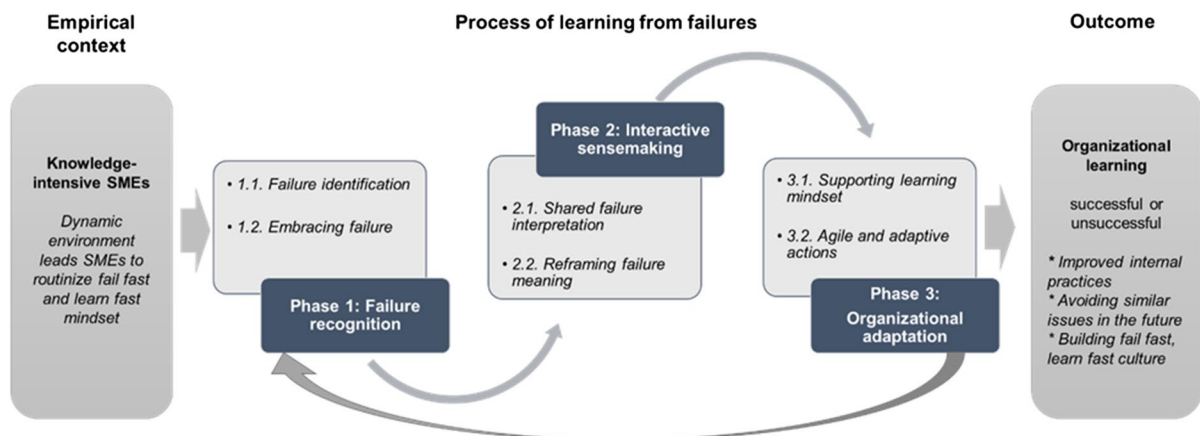


Fig. 2 Conceptualizing the process of learning from failure in SMEs

eral failed journeys, from autonomous drones to a box [hardware solution], to doing something with the data [service-software solution]. They have the technology skills to create value with the right market fit and I think they have found a spot now, which is very attractive marketwise.”

5 Discussion and implications

Our findings offer insights into learning from the failure process, which includes three phases: (1) failure recognition, (2) interactive sensemaking, and (3) organizational adaptation, along with their sub-activities and principles. We further condense our insights into a framework disentangling how SMEs succeed and fail while enabling effective learning from failures. In the following sections, we describe the theoretical, managerial, and policy implications of our study, as well as limitations and suggestions for future research.

5.1 Theoretical implications

This paper empirically examines and conceptualizes the phenomenon of learning from failure in knowledge-intensive SMEs by introducing the fail fast and learn fast mindset. The study offers four key theoretical contributions to the literature on organizational learning.

First, we draw on the literature on organizational learning (e.g., Argote & Miron-Spektor, 2011; Argote et al., 2021; Crossan et al., 1999) and learning from failure (e.g., Cope, 2011; Dahlin, et al, 2018; Edmondson, 2011; McGrath, 2011) to define learning from failure processes as *the organizational processes by which individuals, groups, and organizations recognize failure events, analyze such events to find their causes, and search for and institutionalize solutions to prevent similar failures in the future*. Clarifying the overall processes of learning from failure provides opportunities for further investigation of their underlying phases, micro-practices, and routines. With this study, we challenge the current debate on whether firms indeed learn from failure (see e.g., Bennett & Snyder, 2017; Park et al., 2023), and we stress that processes employed by firms may be one contingency that predicts whether learning from failure will occur or not.

Second, we provide an in-depth process framework detailing the phases and activities of organizational learning from failure. By introducing the framework on learning from failures (see Fig. 2), with specific phases and activities, the study provides a structured view on the relationship between failure and the learning process. Fundamentally, we describe three overall phases: (1) failure recognition, (2) interactive sensemaking, and (3) organization reconfiguration. Each phase includes underlying sub-activities and principles embracing a fail fast and learn mindset. For example, our findings indicate that beyond being cognizant of failure, a key part of individual failure recognition is embracing its learning opportunities. Similarly, we highlight the importance of interactive sensemaking in groups to rapidly expand the scope of learning and stimulate the search for solutions. Accordingly, our study extends the literature by proposing a conceptual processual framework that portrays a way of understanding learning from failures in SMEs. To the best of our knowledge, this is the first study to conceptualize, systematically examine, and illustrate the organizational process of learning from failures, especially in the context of knowledge-intensive SMEs.

Third, the study extends the literature on fail fast and learn fast mindset (see e.g., Sitkin, 1992; McGrath, 2011; Edmondson, 2011; Khanna et al., 2016; Friend et al., 2019, 2020) by incorporating it within the scope of the organizational learning process. While this emerging stream of literature has been focusing on different domains and industries, this study provides insights into the dynamic context of knowledge-intensive SMEs, where failure is an inherent part of existence, to advance a process view on the phenomenon. The framework adapts the fail fast and learn fast mindset to organizational learning, by suggesting only a few simple stepwise practices, to learn effectively in complex and uncertain contexts (e.g., high-tech industries), where failures can be seen as an important source of learning. We describe the cumulative effect of applying such principles systematically. Specifically, as a company goes through the process of learning from a specific failure, the next time, it becomes easier to face a similar challenge and fail fast to learn even faster. Thus, systematized organizational efforts will ingrain fail fast and learn fast mindset into the organizational culture, where failures are celebrated, encouraged, and treated as learning opportunities.

Table 4 Examples of learning processes and outcomes from case companies

Case	Phase 1: failure recognition	Phase 2: interactive sensemaking	Phase 3: organizational adaptation	Outcome
Robotcorp Successful learning from failure	*CEO identified the failure of a “bankrupt” competitor, who was providing similar customer offers. They tried to provide too many different services to cover all customers’ needs, instead of narrowing it down and detecting the key value proposition	*The failure has been analyzed by the team, after the meeting with the competitor, in which the causes were discussed, as well as the consequences of different activities (the CEO of the bankrupt firm was searching for a new job)	*The CEO explored different potential changes to avoid a similar mistake. The decision has been made to narrow down the firm’s offerings to specific value propositions. The experience from the competitor was taken as a great adaptation opportunity	*Learning from a competitor’s failure resulted in an improved organizational process, in terms of modified service offerings. Management discussed this as a valuable learning opportunity to avoid similar failures in the future *Strengthened culture of learning from failures
Gamecorp Successful learning from failure	*Identified failure related to the underestimated cost structure in terms of the amount of time for the project preparation and budget expenses. The team recognized this as a learning opportunity regarding individual limits and capabilities	*Failure recognition stimulated significant efforts in analyzing and interpreting cost overruns in a team, clearly detecting their causes as well as consequences. The team refrained from blaming any individual and conceptualized business model problems, which allowed them to identify a path forward	*Gamecorp explored adaptation opportunities to embrace change and plan client initiatives more carefully by estimating sufficient time for preparation *They decided to experiment with different alternatives (e.g., cost templates) while adapting actions based on their effects	*New processes have been introduced in setting up contracts with clients, especially the estimation of cost structures relating to time and IT costs involved. This created a more robust profit formula for Gamecorp and resulted in the avoidance of additional budgeting failures *Increased awareness to avoid similar failures in the future *Validation of the role of the fail fast and learn fast mindset
MedTechcorp Unsuccessful learning from failure	*Identified failure related to the implementation of new software for simplifying value delivery processes, which simply did not serve the purpose for which it was introduced	*The failure was not embraced as a learning opportunity and individuals were blamed for the deficient implementation. Engaging in joint sensemaking of why this failure occurred was completely missed	*Exploration of adaptation opportunities was missed, and the change was never welcomed. Internal processes have not been reconfigured as a result	*The project has been stopped by the CEO *Unsuccessful learning from the failure, which increased tensions between teams and the potential of repeating the same mistake in the future *Post hoc learning and self-reflection: The CEO noticed that, in this case, he was not following the principles of learning from the failure. He reflected on it and took action to promote learning from failure in the future by encouraging a fail fast and learn fast mindset, instead of the blame game

Finally, we contribute to the literature on entrepreneurial learning and learning in SMEs and start-ups by explicating focus on smaller points of failure. We thus complement prior studies within entrepreneurial learning that have focused on failure as an end of a firm's existence or other catastrophic events (see, e.g., Arino & De la Torre, 1998; McGrath, 1999; Thornhill & Amit, 2003; Politis & Gabrielsson, 2009; Cope, 2011; Mayr et al., 2021). Our study also complements the stream of qualitative research on high reliability organizations (e.g., space shuttles, nuclear power plants, and air traffic control systems) that has primarily analyzed how large firms learn from catastrophic failures (see e.g., Roberts & Rousseau, 1989; Starbuck & Milliken, 1988; Vaughan., 1996). We posit that this literature can be further amplified by an increased focus on smaller points of failure, i.e., a departure from the desired results and goals of the firm (e.g., Dahlin et al., 2018; Rasmussen, 1982; Sitkin, 1992). Indeed, the novelty provided to this stream of literature is found in the focus on learning from smaller and "intelligent" failures, which can serve as valuable learning points that can ultimately save the firm from catastrophic and undesirable outcomes. This has been often overlooked and underappreciated occurrence for SMEs.

5.2 Managerial implications

For knowledge-intensive SMEs, to survive and succeed in dynamic environments, their owners have to understand the benefits of adapting a fail fast and learn fast mindset, in which a collective mindset of continuous learning is fostered. To benefit the most from failure-related learning, we argue that the process of learning from failure is the key. It consists of learning from experimentation, innovation failures, minor failures, intelligent failures, failures of others, and knowledge-based errors that could lead to failure, which are all embodying different learning experiences. From the empirical cases, we have witnessed that this learning process is often unpredictable and abrupt. It is a process marked by oftentimes incremental, but important and crucial learning experiences, which are used to inform future actions. How well business owners use the knowledge gained from these learning opportunities will influence how successful their SME ultimately is.

Therefore, this study provides several implications not only for CEOs of knowledge-intensive SMEs but

also, e.g., for R&D units of larger production companies, on how to facilitate rapid learning from failure in their organizations. We identified three distinct phases of learning from failures, which are furthermore accompanied by a set of distinctive sub-activities and specific principles that have the potential to lead SMEs toward incorporating a fail fast and learn fast mindset and result in pivoting fast when new potential failures come across. The paper also provides a framework illustrating how SMEs succeed and fail in learning from failures through their underlying learning processes. As Kim & Miner (2007) illustrate with a medical analogy, learning from failures offers great insights into "symptoms" as well as a "cure," i.e., a functioning remedy for a problem.

Overall, this study emphasizes the importance of recognizing failures as beneficial for the learning process. As such, failures can be considered and approached as a fundamental part of the firm's innovation process (Khanna et al., 2016). By experimenting and searching for alternatives, firms are creating a base of their organizational learning, which is crucial for innovation capacity building (Khanna et al., 2016; March, 1991). Experimentation should, therefore, be encouraged, even if most of them will ultimately fail. However, failures can serve as ideas, lessons, and valuable learning points for future activities, especially when feedback is provided and the next steps planned. Thus, it is crucial to take an active part, i.e., engage in continuous learning from failures, by involving all team members, across different departments and units, throughout all the phases of the learning process. At the same time, the team needs to have the freedom to do mistakes and fail fast, to learn from each failure, and to do better, while succeeding faster, the next time. Team members should be celebrated for taking risks, failing fast, and sharing their learning with others. This is especially important for knowledge-intensive SMEs who are operating in fast-changing markets, where constant learning and organizational adaptation are critical for survival. Overall, SME managers should ensure to create a culture that encourages, tolerates, and even celebrates failures, as avoiding those is simply not a realistic expectation (McGrath, 2011).

It is important to highlight that we do not argue that there is a universal solution for learning from failures in knowledge-intensive SMEs, as they are so complex and different from each other. Instead, our findings serve as a guide for embracing fail fast

mindset as a part of learning from failure. This can influence managers toward recognizing the role and impact they have on the learning process of their SME and, ultimately, on the success or failure of their firm. By identifying failures and embracing them as learning opportunities, managers can recognize and avoid potentially catastrophic outcomes. By interpreting failures in the team and giving meaning to them, while encouraging openness and not blaming individuals, managers can make sense of them and choose paths to move forward. Finally, by exploring different adaptation opportunities and conducting responsive reconfiguration of the firm’s resources and processes, managers can prioritize, introduce actions, and adapt their responses toward organizational learning, where failures and small losses will be used for achieving success in the forthcoming endeavors of their SME.

5.3 Policy implications

Learning from failures in knowledge-intensive SMEs holds important policy implications. For instance, governmental interventions and policies, especially in dynamic environments, should be based on helping SMEs learn through failures, instead of imposing one-size-fits-all solutions or punishment of failures. Learning from failures should be encouraged and policies should provide support and different financial alternatives for SMEs to experiment, collaborate, and share their experiences. When creating support programs for SME activities, policy-makers should acknowledge the importance of learning from different types of failure, as each type brings beneficial lessons as well as training for SMEs on how to avoid similar issues in the future, thus, prolonging the life of their SMEs and contributing to the economy as a whole. Besides implications for governmental policies, our study has the potential to contribute to universities’ policies and guide their focus on learning from the failure of knowledge-intensive SMEs, especially in turbulent environments.

5.4 Limitations and future research suggestions

As an inductive and exploratory study, this paper is not without limitations. First, we collected in-depth data on three knowledge-intensive SMEs. Although data

saturation has been achieved, the choice of our methodology indicates that the findings are not generalizable in all contexts. Thus, future research could investigate the phenomenon in different empirical contexts and domains, which can complement our findings with additional phases, sub-activities, and specific principles. Second, our data is based on insights from the management perspective, which might consist of biases. Therefore, future studies could consider other team members and their viewpoints on the learning from failures process. Third, our empirical focus is on cultures (Finnish and Swedish) that are known for their proactiveness, innovativeness, and openness toward experimentation, which might have influenced the results. Thus, future studies could complement our findings with insights from different cultures, such as British culture, which has little tolerance for entrepreneurial mistakes. Fourth, although the study has focused on SMEs of different ages and sizes, we did not focus on analyzing those factors concerning learning from failure. Therefore, we encourage future researchers to include these aspects in their studies. Fifth, learning from failure is arguably a topic ripe for study in cutting-edge research areas such as business model innovation (e.g., Thomson et al., 2023), innovation ecosystems (e.g., Oh et al., 2016; Talmar et al., 2020), or circular economy (e.g., Geissdoerfer et al., 2017). Finally, our data not only provide direct experiences of SMEs (i.e., failures experienced by each focal firm) but also detected failures of others (i.e., failures occurred in other firms), which focal firms internalized and learned from. However, as some studies indicate (see, e.g., KC et al., 2013), the source of the failure might influence the learning outcome. Thus, we call for further research to examine various sources of failure in knowledge-intensive SMEs and their relation to different learning outcomes.

6 Conclusions

In this paper, we showed how knowledge-intensive SMEs learn from failures through their organizational learning processes. Knowledge-intensive SMEs represented a suitable study context because they rely heavily on their employees, build relationships and networks, and provide services while operating in dynamic, volatile markets where dealing with failure is a part of the modus operandi. Based on multiple in-depth case studies of three high-tech B2B SMEs,

we proposed a framework that represents the learning from the failure process. Thereby, by extending current thinking and contributing to the literature on organizational learning and learning from failure, as well as on the fail fast and learn fast mindset, we advanced a process view of the phenomenon.

The results indicate the importance of continuously identifying, monitoring, interpreting, and embracing failure as a crucial part of an organizational learning process. We demonstrated that learning from failure while adopting a fail fast and learn fast mindset is the key to success. As failures can be a great source of ideas and lessons for the future, the success of a firm will ultimately depend on the firm's capabilities and openness to use the knowledge gained from those learning processes. This is especially important for SMEs operating in dynamic, fast-changing markets, where constant learning and organizational adaptation are critical for survival. Finally, we call for future research on new concepts and methodologies to deepen the understanding of learning from failure.

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Data availability Data available on request from the authors.

Appendix. Interview questions

1. Can you introduce yourself and your SME briefly?
2. What kind of organizational structure (hierarchy) do you have?
 - a. How does this structure influence learning in your company?
 - b. Are there any benefits or disadvantages of your hierarchy, in relation to learning?

3. When it comes to learning, what does it mean to you and how important is it for your SME?
4. How do you identify failures?
5. How are failures analyzed?
6. How do you use learning from failures?
7. Let us move to concrete examples of learning from failures.
 - a. Can you give me some examples of failures you have experienced? Those that resulted in the most learning.
 - i. What happened and why?
 - ii. What were the main learning points? Describe a learning process.
 - iii. What was the learning that occurred immediately and perhaps later on (after reflection on the event)?
 - iv. How did you learn from these examples (organizational learning)?
 - v. What was your role in this learning process?
 - vi. How did you manage to retain good aspects of learning and eliminate bad ones from the organization's memory?
 - vii. Do you see this learning as positive or negative? How do you see these failures? (As an important source of learning, or something that should be eliminated from your organizational memory)?
 - viii. Did you introduce any new organizational practices based on this learning experience?
8. What are the most important elements of organizational learning in your view?
9. Where do you feel a need to improve and why?
10. Is there anything else you would like to add?

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