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Björn Rietdijk , Koen Dittrich , Erik-Jan Hultink & Shahrokh Nikou

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Discovery–driven capabilities in SMEs: A Kirznerian perspective on firm–level opportunity discovery and adaptation

Björn Rietdijk[a,b], Koen Dittrich[c], Erik-Jan Hultink[a], and Shahrokh Nikou[a]

[a]Department of Design, Organisation, and Strategy, Faculty of Industrial Design Engineering, Delft University of Technology, Delft, The Netherlands; [b]Rotterdam University of Applied Sciences (RUAS) Erasmus University, Rotterdam, The Netherlands; [c]Rotterdam School of Management, Erasmus University, Rotterdam, The Netherlands

ABSTRACT

Small and Medium–Sized Enterprises (SMEs) rarely engage in resource reconfiguration processes. Instead, constrained by their size and scope, they typically renew their existing resources through ongoing adaptive engagement with their environment. This process raises questions whether the dynamic capability theory, which is largely grounded in Schumpeterian assumptions of intentional resource recombination and disruption, can adequately capture how SMEs adapt to strategic change. Building on a Kirznerian perspective of entrepreneurial opportunity discovery, this inductive qualitative study of 14 Dutch SMEs investigates how SMEs discover, mobilize, and adapt to opportunities while renewing their competitive advantage. Our study identifies three interrelated capabilities, (i) alertness, (ii) responsiveness, and (iii) resilience that operate as discovery–driven capabilities. These capabilities enable SMEs to identify overlooked opportunities, act swiftly, and adapt rapidly to strategic change. These findings advance entrepreneurship theory in two ways. First, by grounding discovery–driven capabilities as a firm–level extension of Kirznerian entrepreneurial discovery, we advance understanding of whether and how SMEs can possess dynamic capabilities and deepen our knowledge of capability deployment in SME contexts. Second, we contribute to literature by reconceptualizing alertness, responsiveness, and resilience, often studied in isolation, as interrelated, firm–level capabilities within a unified discovery–driven framework, thereby offering a new perspective for examining these capabilities in conjunction.

KEYWORDS

Dynamic capabilities; entrepreneurship; Kirzner; opportunity discovery; Schumpeter; SMEs

Introduction

Understanding why some firms succeed during strategic change while others fail represents a central question to entrepreneurship and Dynamic

CONTACT Shahrokh Nikou S.N.Nikou@tudelft.nl Department of Design, Organisation, and Strategy, Faculty of Industrial Design Engineering, Delft University of Technology, Landbergstraat 15, 2628 CE, Delft, The Netherlands.

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Capability (DC) theory (Arend, 2014; D. J. Teece et al., 1997). Prior studies suggest that the transition between these two perspectives is closely linked to firm size and maturity. As firms grow, the accumulation of capabilities developed to exploit earlier entrepreneurial opportunities gives rise to organizational rigidities, which increases the need for DCs to overcome path dependencies and inertia (Arthurs & Busenitz, 2006; Dierickx & Cool, 1989; Lanza & Passarelli, 2014; Leonard-barton, 1992; Woldesenbet et al., 2012). While this evolutionary logic offers a compelling explanation for large, established firms, its applicability is less clear in the context of small and medium–sized enterprises (SMEs).

DC theory is rooted in Schumpeterian thought, which views opportunities as arising from disruptive innovations that reshape markets and disturb equilibria (Guerrero & Siegel, 2024; D. J. Teece et al., 1997; Pisano & Teece, 1994). Firms that exploit such endogenous opportunities are typically large and established, with a history of market–defining innovations (and often collaborations with universities) to drive radical innovation (J. A. Schumpeter, 2013; De Jong & Marsili, 2015, 2010; O'Connor & DeMartino, 2006; Shane, 2003). As a result, this theoretical framing offers limited explanatory power for opportunity formation in resource–constrained SMEs and has led to divided views on whether SMEs possess dynamic capabilities.

Some scholars argue that SMEs lack DCs due to resource constraints, short planning horizons, and the absence of formalized routines and organizational structures (Arend, 2014; Delmar & Shane, 2003; Helfat & Peteraf, 2003; D. J. Teece et al., 1997; Mahoney, 2004; Sidney, 2003; Strotmann, 2007). Others argue that SMEs do exhibit DCs, albeit in distinct forms, by leveraging entrepreneurial characteristics such as social networks, adaptability, and innovation to reconfigure resources (Arthurs & Busenitz, 2006; Branzei & Vertinsky, 2006; Zahra et al., 2006; Zollo & Winter, 2002). However, both perspectives remain anchored in a Schumpeterian understanding of opportunity creation, leaving questions unanswered about how SMEs recognize and act upon opportunities in the absence of extensive resources.

This study adopts a Kirznerian perspective on entrepreneurial opportunity discovery (Kirzner, 1983, 1985, 1997). This perspective helps to explain how resource–constrained SMEs can generate rents by identifying and exploiting overlooked opportunities, and by continuously adapting to incremental change rather than pursuing radical innovations (De Jong & Marsili, 2015; Korsgaard et al., 2016; Sundqvist et al., 2012). Accordingly, the present study addresses the following research question: How do SMEs discover, mobilize, and adapt to opportunities in dynamic environments?

To address this question, we conducted a qualitative, inductive study across 14 Dutch SMEs. Our findings show that SMEs operate neither through entrepreneurial capabilities nor through DCs as traditionally defined. Instead, they rely on a distinct set of discovery–driven capabilities, consisting

of alertness, responsiveness, and resilience. We find that alertness enables SMEs to identify signals, changes, and market imperfections that others overlook. Responsiveness enables SMEs to convert these insights into action through evaluating and coping of opportunities, and resilience equips SMEs to prepare and adjust to evolving opportunities in ways that sustain and renew their competitiveness, yet these capabilities are most consequential in interaction, and not in isolation.

Alertness coupled with responsiveness generates a speed advantage by enabling rapid opportunity identification and early action. Responsiveness coupled with resilience supports dynamic adjustment by embedding learning and recalibration into execution. Resilience, coupled with alertness, strengthens opportunity preparation by enabling anticipatory action and continuous learning. These dynamics enable SMEs to respond to previously undetected or emerging developments, while maintaining a proactive stance toward change.

This paper makes two main contributions. First, it offers a theoretically grounded alternative to DC theory by articulating discovery–driven capabilities as a mode of adaptation rooted in continuous opportunity discovery rather than planned resource transformation, thereby addressing longstanding debates over whether SMEs can possess DCs (Arend, 2014; Zahra et al., 2006). Second, it advances theory by reconceptualizing alertness, responsiveness, and resilience, often studied in isolation (Day, 1994; Duchek, 2020; Tang et al., 2023, 2012), as interrelated, firm–level capabilities within a unified discovery–driven framework. These contributions are elaborated in the Discussion (Section 5).

This paper is structured as follows. A review of the literature on entrepreneurial and dynamic capabilities, introducing capabilities from a Kirznerian perspective is provided next. Then we present the methodology and data collection procedure, followed by presenting the findings, and the discussion, theoretical contributions, and practical implications. Finally, the conclusion is presented.

Theoretical foundation

Entrepreneurial and dynamic capabilities

Entrepreneurship and DC research both explain why some firms succeed during strategic change, but they differ in how economic value is created and captured: entrepreneurship focuses on short–lived returns from risky opportunity pursuit, while DCs emphasize quasi–rents through the reconfiguration of firm–specific resources in established firms (Arend, 2014; D. J. Teece et al., 1997). This distinction is reflected in the nature of capabilities emphasized by each perspective. Entrepreneurial capabilities concern identifying and investing in new

opportunities, whereas DCs involve adjusting existing resources to exploit current opportunities (Arif & Herawan, 2025; Arthurs & Busenitz, 2006; Lanza & Passarelli, 2014; Woldesenbet et al., 2012). As ventures mature, accumulated capabilities create rigidities, which assumes that DCs become increasingly necessary to adapt to changing environments (Arthurs & Busenitz, 2006; Dierickx & Cool, 1989; Leonard-barton, 1992). However, the DCs perspective (Teece, 2016) is grounded in Schumpeter's thoughts (J. A. Schumpeter, 2013). Schumpeter saw economic development as driven by entrepreneurs who seize technological opportunities independent of market demand to introduce groundbreaking innovations. These innovations grant entrepreneurs temporary market monopolies, which erode as imitators replicate or adapt them (Hervé et al., 2022; De Jong & Marsili, 2010; Pisano & Teece, 1994).

The DCs approach shifts Schumpeter's focus from external forces to internal organizational processes, explaining how firms develop and transform to sustain competitive advantage in dynamic environments (Pisano & Teece, 1994). It highlights unique processes, assets, market positions and strategic paths while considering the replicability and imitability of capabilities (D. J. Teece et al., 1997). Consistent with Schumpeterian assumptions, DC theory recognizes that new knowledge and information may disrupt market equilibrium and create endogenous opportunities (Schumpeter & Opie, 1934; Teece, 2007). Firms that successfully exploit these Schumpeterian opportunities are frequently large and resource–rich, strategically focused on product development, active in patenting, and engaged in collaborations with universities and research institutions (De Jong & Marsili, 2015, 2010; J. Schumpeter, 1942; Shane, 2003). However, these assumptions sit uneasily with the empirical realities of SMEs. SMEs typically operate with limited resources, informal organizational structures, and short planning horizons.

Rather than pursuing radical innovation, SMEs often focus on niche markets, incremental improvements, and close relationships with customers and long–standing partners (Alves et al., 2016; Arend, 2014; Ates et al., 2013; Borch & Madsen, 2007; Frank & Roessl, 2015; Heider et al., 2021; Hermawati, 2020; Van de Vrande et al., 2009).

Accordingly, we propose that as ventures mature, they do not necessarily shift toward the adoption of endogenous opportunities creation and the development of DCs (De Jong & Marsili, 2010; Pisano & Teece, 1994). Instead, they increasingly focus on cultivating capabilities to identify and exploit exogenous opportunities, consistent with a Kirznerian perspective (Kirzner, 1983; Narver & Slater, 1990).

Distinguishing capabilities from a Kirznerian perspective

Building on Kirzner's theory of entrepreneurial discovery (Kirzner, 1983, 1985, 1997), we develop a Kirznerian perspective on firm capabilities that is conceptually distinct from DC theory. Three fundamental distinctions distinguish these two theoretical perspectives, leading to the establishment of the conceptual foundations of discovery–driven capabilities.

First, the perspectives differ in the locus of opportunities. DC theory, following Schumpeter, treats opportunities as endogenous: created by the firm through deliberate internal resource reconfiguration, knowledge development, and innovation routines targeted at disrupting markets (D. J. Teece et al., 1997; Pisano & Teece, 1994). This logic is most coherent for large, resource–rich firms with the capacity to engineer market change. A Kirznerian perspective, by contrast, treats opportunities as exogenous: they arise continuously from market imperfections, dispersed knowledge, and informational asymmetries that exist independently of any firm's actions (De Jong & Marsili, 2015; Levasseur et al., 2024; McCaffrey, 2014). Opportunities are not created through innovation but discovered through heightened sensitivity to inconsistencies between current market conditions and their potential uses (Korsgaard et al., 2016; McCaffrey, 2014). This distinction is not merely semantic; it determines what capabilities are theoretically required and how they manifest organizationally.

Second, the perspectives differ in the nature of learning and capability enactment. In DC theory, capabilities are identifiable organizational routines: deliberate, semi–permanent, and subject to intentional orchestration through structured search and asset recombination (Eisenhardt & Martin, 2000; Teece, 2007; Zollo & Winter, 2002). Kirznerian capabilities, by contrast, are emergent and practice–based. They manifest in real time through improvisation, ad hoc problem–solving, and rapid adjustment rather than through formalized organizational memory or planned reconfiguration (Liao et al., 2003; Sidney, 2003). This renders them qualitatively different from DCs even where behavioral similarities appear superficially. We acknowledge that Teece's (2007) sensing–seizing–transforming triad shares some surface similarities with the alertness–responsiveness–resilience framework developed here. However, the underlying logic differs. Sensing in DC theory drives endogenous opportunity creation through deliberate knowledge routines; alertness, in the Kirznerian tradition, concerns noticing what already exists but has been overlooked (Kirzner, 1973; McCaffrey, 2014). Seizing involves committing substantial resources to opportunities identified through formal analysis; responsiveness, as we conceptualize it, operates through rapid, low–cost evaluation and prototyping without large–scale resource commitment. Transforming refers to continuous realignment of tangible and intangible assets; resilience, as developed here, concerns sustaining adaptability through forward–looking

Table 1. Discovery–driven capabilities vs. dynamic capabilities.

Dimension	Dynamic Capabilities (Teece, 2007)	Discovery–Driven Capabilities (This Study)
Theoretical root	Schumpeterian: opportunity creation through innovation and disruption (Schumpeter & Opie, 1934, J. Schumpeter, 1942; Teece, 2007)	Kirznerian: opportunity discovery through alertness to market imperfections (Kirzner, 1973; Kirzner, 1983; Kirzner, 1985; Kirzner, 1997)
Locus of opportunities	Endogenous: created deliberately by the firm through resource reconfiguration and knowledge development (Pisano & Teece, 1994; D. J. Teece et al., 1997)	Exogenous: arise independently from market imperfections, dispersed knowledge, and informational asymmetries (De Jong & Marsili, 2015; Levasseur et al., 2024)
Nature of capabilities	Identifiable organizational routines: deliberate, semi–permanent, and subject to intentional orchestration (Eisenhardt & Martin, 2000; Teece, 2007; Zollo & Winter, 2002)	Emergent and practice–based manifested through improvisation, rapid prototyping, and ad hoc problem–solving (Liao et al., 2003; Sidney, 2003)
Alertness/ Sensing	Deliberate environmental scanning driven by knowledge–creating routines targeted at endogenous opportunity creation (Teece, 2007)	Cultivating organizational conditions under which alertness to overlooked market signals is more likely to arise and be acted upon (Kirzner, 1973; McCaffrey, 2014; Araujo et al., 2023; Chavoushi et al., 2021)
Responsiveness/ Seizing	Large–scale resource commitment to opportunities identified through formal analysis (Teece, 2007)	Rapid, low–cost evaluation and prototyping at low resource thresholds without large–scale commitment (Garrett et al., 2009; Khan & Khan, 2021; Wei et al., 2014)
Resilience/ Transforming	Continuous structural realignment of tangible and intangible assets across the organization (Teece, 2007)	Sustaining adaptability through incremental preparation and adjustment without structural reconfiguration (Duchek, 2020; Zhang et al., 2023)
Treatment of learning	Formalized organizational memory – structured search and deliberate knowledge accumulation (Zollo & Winter, 2002; Eisenhardt & Martin, 2000; Teece, 2007)	Real–time, experience–based learning through trial–and–error and cross–project knowledge transfer (Kirzner, 1983; Kirzner, 1997; Zahra et al., 2006)
Focal firm type	Large, resource–rich firms with capacity to engineer market change (J. Schumpeter, 1942; De Jong & Marsili, 2010; De Jong & Marsili, 2015; Shane, 2003)	Resource–constrained SMEs operating under environmental uncertainty (Alves et al., 2016; Frank & Roessl, 2015; Heider et al., 2021)
Managerial logic	Orchestrating and reconfiguring asset portfolios to close performance gaps (D. J. Teece et al., 1997; Whetten, 1987; Teece, 2007)	Noticing, mobilizing, and adapting to exogenous opportunities within existing resource constraints (De Jong & Marsili, 2015; Levasseur et al., 2024; McCaffrey, 2014)

Note: The distinctions presented above reflect ideal–type theoretical differences. In practice, SMEs that grow over time may develop elements of both frameworks, consistent with the bridge function argument developed in Section 5.1.

preparation and incremental adjustment, not structural reconfiguration. These distinctions are summarized in Table 1 and elaborated empirically in Sections 4 and 5, and discussed in depth in Section 5.1.

Third, the perspectives differ in their treatment of alertness as deliberate vs. non–deliberate. Kirzner himself viewed alertness as a non–deliberate cognitive disposition rather than a managed process (Kirzner, 1973; Korsgaard et al., 2016). This presents a theoretical tension when elevating alertness to the firm level. We address this tension through the microfoundations perspective (Felin et al., 2015): firm–level capabilities need not be direct aggregations of individual cognitions. Rather, they emerge from the interaction of individual dispositions, organizational practices, and structural conditions. What is non–deliberate at the individual level can be systematically cultivated at the organizational level through practices that create conditions under which alertness

is more likely to be triggered and acted upon. Practices such as customer proximity, industry network participation, and data–driven performance monitoring do not manufacture alertness artificially; they lower the barriers to discovery by ensuring that informational asymmetries are more readily encountered and recognized. This preserves the Kirznerian insight that alertness cannot be managed in the conventional sense, while still enabling a coherent organizational–level theory of how firms collectively remain alert (Araujo et al., 2023; Chavoushi et al., 2021; Shepherd, 2011).

Central to this perspective is a firm's entrepreneurial alertness capability that heightens sensitivity to market imperfections, informational asymmetries, and weak signals that other firms fail to notice (De Jong & Marsili, 2015; Levasseur et al., 2024; McCaffrey, 2014). Opportunity discovery thus depends less on formal knowledge creation and more on the interpretation and recombination of uneven knowledge distributions from experimentation and locally embedded knowledge (Kirzner, 1983, 1997). Learning occurs through continuous engagement with the market, experimentation, and trial–and–error rather than through routinized knowledge storage or formalized organizational memory (Zahra et al., 2006).

From a Kirznerian perspective, capabilities differ in their nature as Kirznerian capabilities are behavioral and practice based. They manifest in real time as firms respond to emerging situations through improvisation, ad hoc problem–solving, and rapid adjustment (Liao et al., 2003; Sidney, 2003). Responsiveness, in this sense, reflects the firm's capacity to translate discovered opportunities into timely action without engaging in extensive planning or resource reconfiguration (Garrett et al., 2009; Khan & Khan, 2021; Wei et al., 2014).

The underlying process logic further distinguishes the two as DCs are recursive and performance–oriented, driven by feedback relative to aspiration levels and by deliberate searches for new asset combinations to close performance gaps (Whetten, 1987). This logic presumes organizational stability, routinization, and sufficient resources to support planned reconfiguration (Arthurs & Busenitz, 2006; D. J. Teece et al., 1997). Kirznerian capabilities, by contrast are emergent and opportunity–oriented with the external environment serving as the primary reference point (De Jong & Marsili, 2015; Levasseur et al., 2024; McCaffrey, 2014). This requires a resilience capability through which opportunities are defined in action as firms iteratively anticipate, interpret feedback, and adjust in real time, enabling adaptive responses as situations unfold (Duchek, 2020; Zhang et al., 2023).

Organizational context sharpens this distinction further. Kirznerian capabilities are particularly salient in SMEs, which typically lack the slack resources, formal routines, and planning horizons required for

deliberate resource orchestration (Alves et al., 2016; Arend, 2014; Ates et al., 2013; Frank & Roessl, 2015). At the same time, their flat structures, proximity to customers, and reliance on experiential learning afford distinct forms of adaptability (d'Amboise & Muldowney, 1988; Heider et al., 2021). Because knowledge is less institutionalized and routines are less entrenched, SMEs can remain alert to emerging opportunities and act quickly without engaging in extensive reconfiguration processes (Zahra et al., 2006). Rather than restructuring the organization to fit a predefined strategic vision, SMEs with Kirznerian capabilities shape and adjust their resource base incrementally as opportunities unfold (Ates et al., 2013; Heider et al., 2021; Hermawati, 2020).

As firms grow and their resource bases become more established, the conditions supporting Kirznerian capabilities may narrow. Increasing routinization and path dependencies can reduce alertness and constrain adaptive responsiveness (Arthurs & Busenitz, 2006; Dierickx & Cool, 1989; Leonard-barton, 1992). Studying SME capabilities from a Kirznerian perspective is therefore essential not only for clarifying where entrepreneurial capabilities end and DCs begin, but also for advancing a more behavioral and practice–based understanding of how SMEs discover, mobilize, and adapt to opportunities in dynamic environments.

Methodology

Research design

Current theory on entrepreneurship and capabilities offers contradictory and incomplete explanations of the capabilities through which SMEs discover, mobilize, and adapt to opportunities in dynamic environments. Because existing constructs are largely grounded in assumptions that may not reflect SMEs lived practices, this study adopts a qualitative, inductive research design. Inductive theory–building is particularly suitable in this research context, where dominant theories risk obscuring alternative explanatory mechanisms and existing constructs are insufficiently specified to SMEs (Eisenhardt & Graebner, 2007; Gioia et al., 2013).

This approach allows novel concepts, relationships, and models to emerge directly from empirical observations and is well–suited to exploring complex phenomena in real–world settings, thereby addressing the how questions central to entrepreneurship research (Yin, 2017). Moreover, qualitative methods enable the generation of rich, contextualized insights that are difficult to capture through quantitative approaches, particularly when investigating SMEs' capability practices and behavior in resource–constrained environments (Javadian et al., 2020; Van Burg et al., 2022).

Data collection

Empirical data were collected across 14 SMEs operating in diverse industries and markets in the Netherlands using purposeful and snowball sampling (Gerring, 2006; Patton, 1990; Spigel, 2017). Appendices A and B provide an overview of firm characteristics and company profiles.

Data collection proceeded in two distinct stages. In the primary generative stage, six SMEs were interviewed in 2019 to develop the initial theoretical framework. These interviews formed the empirical basis for theory construction and drove the inductive coding process. Following theoretical saturation at 18 interviews, a secondary confirmatory stage extended the sample by including four firms in late 2021 and four firms in late 2022. These eight additional cases served to validate and refine the developed framework rather than to generate new categories, consistent with principles of theoretical sampling and confirmatory data collection in inductive research (Bowen, 2008; Eisenhardt & Graebner, 2007; Glaser & Strauss, 1967).

We acknowledge that one firm in our sample, namely Eta, employs 373 full–time equivalents, marginally exceeding the European Commission's upper threshold of 249 employees for medium–sized enterprises (European Union Commission, 2003). However, Eta was retained in the sample because it was originally selected in 2019 when its headcount fell within SME boundaries, and because its organizational profile, resource constraints, flat structure, and capability behavior remained consistent with the SME characteristics observed across the wider sample throughout the data collection period. On this basis, Eta serves as an instructive boundary case: its inclusion helped us to test and reinforce the theoretical argument that discovery–driven capabilities are not strictly size–determined but reflect a distinct organizational logic that persists even as firms approach the SME–large firm boundary (Eisenhardt & Graebner, 2007; Yin, 2017).

Interviews were the primary data source for this research. In total, we conducted 50 semi–structured interviews. Given the centralized nature of decision–making in SMEs, the interviews focused on owners, CEOs, and members of the management team who were directly involved in innovation and strategic decision–making. Interviews began with owners or CEOs to establish a firm–level perspective, followed by interviews with management team members to gain deeper insight into operational and adaptation processes. Limiting interviews to senior decision–makers from diverse functional backgrounds helped enhance construct validity and reduce informant bias (Gibbert et al., 2008). We employed a standardized semi–structured interview protocol to ensure consistency across interviews while allowing flexibility to probe emergent themes (Yin, 2017). Interviews lasted between 60 and 90 minutes, were audio–recorded, and transcribed verbatim. Initial questions focused on interviewees' backgrounds, roles, and tenure, followed by questions

Table 2. Data collection.

Data Sources	Number	Data Sources	Number
Semi–structured interview (2019)	18 (6 SMEs)	News items (2015–2021)	22
Semi–structured interview (2021)	18 (4 SMEs)	Videos (2015–2020)	8
Semi–structured interview (2022)	14 (4 SMEs)	Public data	30
Total number of interviews	**50**	**Total number of secondary data**	**60**

addressing opportunity identification, responses to environmental change, and the adaptation of organizational structures and resources. Questions were designed to elicit concrete examples of actions, events, and behaviors, rather than abstract opinions (Huber & Power, 1985).

To enhance data triangulation and accuracy, we supplemented interview data with secondary sources, including internal documents, news articles, videos, and publicly available materials (Gibbert et al., 2008). These materials were reviewed prior to interviews to develop initial codes, refine interview questions, and verify factual claims (Flick, 2018). Table 2 summarizes the data sources used in this study. The iterative process of data collection and analysis allowed emerging insights to inform subsequent sampling decisions (Gioia et al., 2013; Glaser & Strauss, 1967). Saturation was assessed based on the absence of new codes, themes, and theoretical relationships (Guest et al., 2006; Hennink et al., 2017), consistent with the staged design described above.

Data analysis

Data analysis followed an inductive theory–building approach, using the Gioia methodology (Gioia et al., 2013; Glaser & Strauss, 1967). Data analysis was an iterative process, involving continuous interaction between data, emerging concepts, and relevant theory. We used Atlas.ti to support systematic coding and data organization (Miles et al., 2018; Saldaña, 2021; Strauss & Corbin, 1990). This process involved organizing the data into first–order categories (participants' language), second–order themes, and aggregate dimensions (Figure 1).

This coding process helped in structuring the data and identifying key patterns and insights. The first–order categories were developed by the first and the last authors through an analysis of both primary and secondary raw data. We began by identifying relevant phrases in the secondary data that directly addressed the research question (RQ). Based on this analysis, an initial set of first–order categories was developed. These categories were then further examined and refined through a detailed analysis of the primary data. Interview transcripts were analyzed line by line by two authors to validate and enrich the initial insights drawn from the secondary data. This iterative process enabled the development of comprehensive first–order categories, e.g., technological scanning, regulatory monitoring, customer proximity and

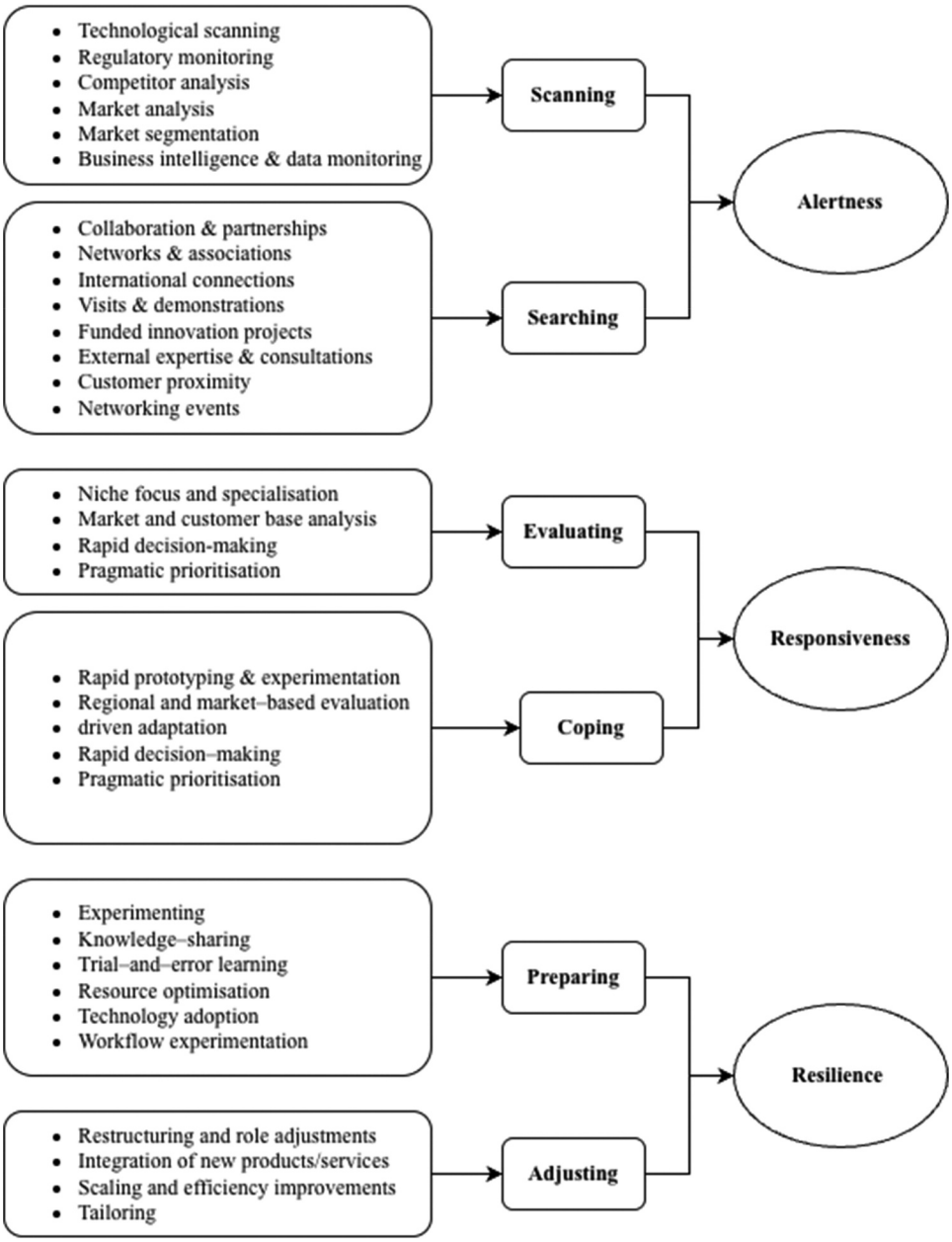


Figure 1. Data structure.

dialogue, supplier and industry collaboration, and international market connections.

Subsequently, the first–order categories were organized into second–order themes, reflecting the key concepts from the entrepreneurial opportunity and capability literatures (e.g., scanning, searching, evaluating, coping, preparing, adjusting). Organizing the first–order categories under these second–order

themes enabled us to link empirical data with theoretical constructs, grounding our findings in both theory and empirical evidence. Finally, the second–order themes were grouped into aggregate dimensions, which were informed by the existing literature on Kirzner's theory of entrepreneurial opportunity discovery and capabilities research (Day, 1994; Duchek, 2020; Kirzner, 1997; Tang et al., 2012). This approach facilitated the identification of connections and patterns among the second–order themes.

Research quality, member–checking, and reflexivity

To enhance the credibility and transferability of our findings, we employed several measures of research quality consistent with standards for qualitative inductive inquiry (Gibbert et al., 2008; Lincoln & Guba, 1985). Data triangulation was achieved through the combination of interview transcripts, internal company documents, news articles, and video materials, enabling cross–validation of emerging insights across multiple sources (Flick, 2018). Construct validity was supported by the use of a standardized interview protocol, multiple informants per firm from diverse functional backgrounds, and the iterative comparison of emerging codes against secondary materials (Gibbert et al., 2008; Yin, 2017). Theoretical replication across 14 firms strengthened the robustness of the framework (Eisenhardt & Graebner, 2007).

Member–checking was conducted to strengthen the credibility and communicative validity of the findings (Creswell & Miller, 2000; Lincoln & Guba, 1985). Following the development of the initial theoretical framework, we shared summary findings with the key informants from the firms that participated in the primary data collection phase and invited them to review whether the emergent constructs – alertness, responsiveness, and resilience – and their associated micro–foundations accurately reflected their firms' experienced practices. Feedback from this process confirmed the alignment of the framework with participants' experiences and, in two instances, prompted refinements to the language used to describe specific practices, enhancing the internal coherence of the first–order categories. We acknowledge the importance of researcher reflexivity in qualitative inductive research (Gioia et al., 2013; Haynes, 2012). The research team comprised scholars with backgrounds in entrepreneurship, strategic management, and SME innovation. This expertise facilitated sensitivity to the theoretical constructs under investigation. The iterative use of secondary materials (interview notes) as independent data sources served as an additional check against premature theoretical closure. Where our Kirznerian framing shaped the direction of coding, we make this explicit in Section 4; our analytical intention was to allow the theoretical framing to emerge from, rather than be imposed upon, the empirical data.

Specifically, alertness was retrieved as an aggregate dimension encompassing the continuous monitoring of the environment for changes, signals, and market imperfections while intentionally seeking targeted information or relationships to address specific knowledge gaps (Busenitz, 1996; Kaish & Gilad, 1991; Tang et al., 2012). Then, a second aggregate dimension was defined as responsiveness, which encompasses the ability to quickly interpret and act upon markets and environmental stimuli to advance emerging opportunities (Garrett et al., 2009; Khan & Khan, 2021; Wei et al., 2014). Finally, a third aggregate dimension emerged from the analysis, resilience. Resilience includes the anticipating, responding, and learning from opportunities to sustain in dynamic environments (Duchek, 2020; Zhang et al., 2023).

Findings

This section presents the discovery–driven capabilities and explains how they jointly enable SMEs to adapt in resource–constrained, dynamic environments. It begins with alertness as the first capability enacted through two microfoundations–scanning and searching.

Alertness

Based on the findings, we conceptualize alertness at the firm–level as the ability to continuously monitor the environment for changes, signals, and market imperfections while intentionally seeking targeted information or relationships to address specific knowledge gaps. This conceptualization extends prior individual–level operationalizations of alertness (Busenitz, 1996; Kaish & Gilad, 1991; Tang et al., 2012) while remaining consistent with Kirzner's core idea that alert actors notice emerging opportunities overlooked by others (Kirzner, 1973). The analysis revealed two distinct but interconnected microfoundations of firm–level alertness: *scanning* and *searching*. Scanning reflects broad and ongoing environmental monitoring through technological scanning, regulatory monitoring, competitor analysis, market analysis, market segmentation, and business intelligence and data monitoring. Searching, by contrast, involves focused and intentional efforts to obtain specific information and close knowledge gaps through customer proximity and dialogue, early–stage customer involvement, supplier and industry collaboration, external expertise and consultations, international market connections, and trade visits and demonstrations.

The key distinction between scanning and searching lies in their orientation and trigger. Scanning is environmentally oriented and continuous: firms monitor broad technological, regulatory, and competitive developments without a specific opportunity in mind. Searching is relationally oriented and purposive: firms actively engage customers, suppliers, and external partners

to address specific knowledge gaps or validate emerging opportunity signals detected through scanning. Together, scanning and searching constitute the firm–level microfoundations through which SMEs maintain continuous alertness to overlooked market opportunities. Table 3 shows illustrative quotes from interviewees supporting these dimensions.

Scanning

We define scanning as a broad, ongoing, and systematic process through which firms gather, interpret, and evaluate information about external developments that may affect their activities (Tang et al., 2012). While prior research predominantly conceptualizes scanning as an individual–level cognitive activity associated with entrepreneurial alertness (Baron, 2006; Tang et al.,

Table 3. Alertness.

Representative Supporting Data for Each 2nd Order Theme	
Scanning	• Suppliers (competitors) are also shifting, so then you start thinking, what are you going to do, which model do you need? Autonomous sharing came up, the knowledge was not there, and the labor is not there because 10 hectares require so many people, but 100 hectares simply need 400 people walking through the greenhouses. And I do not know if you have ever been to the desert in Mexico. You do not want to live there, but certainly not work there either. So, no labor is available there either. So, out of global concerns that exist, labor shortages, and knowledge shortages, that is how our innovation came into existence. (Director/Kappa) • For example, where you have many more sensors in it that improve various things and based on which you could learn about how well the device actually performs in practice, where failures come from, and how you can then go on to prevent them. (Financial director/Iota) • The research I have done on mapping out the age of all installations. I think that was a good start to get started with servitisation. (Commercial manager/Mu) • There is development potential (spray system) in this, and we are also doing our utmost best for it. We have also decided that when it comes to developments, we are really going to focus on this (monitoring and analysis). That does not mean we are letting go of the rest, but it is becoming the main focus. (Director/Lambda) • We could, for example, use those models we just talked about so that you can see what happens with the installation, if you can monitor it per square meter, to stay in conversation with the customer and implement all kinds of things that were not known or possible before. (Director/Xi)
Searching	• If you look at the employees of our customers who operate our machines and compare that which how it uses to go: in the past, they had people who had some technical know–how and found it interesting to work with a machine. Nowadays, it's basically like a newspaper delivery person who has to turn on the machine and expects it to just run for production. If there is a problem, they immediately go to the supplier, saying, "It's not working, so what's going on?" That's where more and more work is coming in. (Programmer/Nu) • You just see that customers, of course, are becoming increasingly critical. They just expect a certain uptime from a product and expect us to think along with them as much as possible. From that perspective, you should therefore invest in it. • (Financial director/Iota) • There has also been communication with the customers, they have been in conversation like, imagine if we were to do this, so choosing this direction, would it be interesting for you? The customers are also involved in the development process. (Service manager/Kappa) • We do have a collaboration with the supplier; with some things service could be possible. We also make disinfection tunnels to disinfect roll containers with a certain agent, and that you could supply that with an agent to clean it, but then you would have to do a lot of research. (Sales manager/Lambda) • What we also see, especially on the side of oil and gas companies, is that for a long time, and I'm talking about the past 5 to 4 years, enormous pressure has been put on their business model, which also translates to us. And that they only want to invest in existing oil and gas fields if the oil and gas price allows it. So, basically, always wanting to make the minimal investment. (Business development manager/Mu)

2012; Valliere, 2013), the findings demonstrate that scanning is enacted at the organizational level. This organizational enactment of scanning is consistent with the Kirznerian argument that alertness to market imperfections need not remain a purely individual cognitive act but can be cultivated through organizational practices that lower the barriers to opportunity detection (Felin et al., 2015; Kirzner, 1973).

Across cases, SMEs actively monitored technological developments, competitor activities, and adjacent markets. For example, firms tracked innovations in related industries to anticipate future shifts in customer expectations or product technologies. As the commercial director of Gamma explained: "*The automotive sector is already much further ahead, with higher production speeds. They use carbon fibre that is lighter than aluminium, although more expensive. You see it in luxury cars like Rolls–Royce and Bentley, but also the BMW E3 uses full carbon.*"

In addition to environmental monitoring, SMEs systematically analyzed competitors to derive strategic insights. Rather than viewing large competitors as threats, firms treated them as reference points for learning and anticipation, allowing them to respond proactively to emerging market trends. The CEO of Epsilon explains: "*Our biggest competitor is Bosch Switzerland. It is, of course, a gigantic, big company. They are perhaps indeed earlier able to replenish a certain type of packaging just a bit earlier than we, but I can learn from that. Like, hey, they are coming with a new kind of packaging, what does that mean for Epsilon? And then I want to jump on it right away.*" SMEs also engaged in deliberate market segmentation to support scanning activities. Geographic segmentation enabled firms to prioritize specific regions: "*We are still focusing on a customer area, now North America, Canada, and we are not suddenly also going to Turkey. We look at each region, we serve them*" (Owner/Delta). In addition, value–based segmentation, such as annual ABC analysis, helped access customer importance and strategic relevance: "*We do a review once a year, we call it the ABC analysis of our customers. We look at how important our customer is to us*" (Co–owner/Alpha).

Firms also segment customers based on the technology they use, as seen in the shipbuilding sector: "*Zeta has a very good idea of who has ships with our engines in them. These are essentially potential customers; a large portion of the customers says: These engines are so old, we no longer need the dealer to work on them. We outsource that to others. And some customers are so large that they simply have their own technical staff to carry out their repairs. Then we do not need to come either. At most for supervision*" (Business development manager/Zeta).

In addition, many SMEs use business intelligence tools and sensor–based monitoring to track product and process performance, identify deviations, and generate real–time insights. These practices enabled firms to detect weak signals early and respond quickly: *We measure the hours that it works and*

that it does not work. We know the moves. The number of moves that it makes, the number of containers that it lifts. So, we try, in the end, to extract the performance, something of performance measurement" (Owner/Iota).

Whereas prior research predominantly conceptualized scanning as an individual cognitive process (Baron, 2006; Gaglio & Katz, 2001; Sharma, 2019), the findings reveal that scanning is enacted through shared analytical practices embedded within the organization. These findings provide answers to the call by Araujo et al. (2023) to advance theorizing of entrepreneurial alertness beyond the individual level. Scanning within the SMEs is a continuous process supported by practices such as customer segmentation, ABC analyses, and business intelligence. This process shows that alertness can be enacted across the organizational level rather than remaining an intuitive, episodic act of individual discovery (Araujo et al., 2023; Tang et al., 2012). Furthermore, the integration of data analytics and performance monitoring illustrates how technology amplifies scanning capability, giving rise to a data–driven form of organizational awareness that enhances adaptability (Teece, 2007).

Searching

We define searching as a focused and intentional process through which firms seek specific information, knowledge, or resources to address identified gaps (Tang et al., 2012). Prior research highlights antecedents such as prior knowledge, social networks, and environmental complexity as triggers of entrepreneurial alertness at the individual level (Ardichvili et al., 2003; Chavoushi et al., 2021; Tang et al., 2009). The findings show that these antecedents also operate at the firm level, shaping organizational search behaviors (Araujo et al., 2023; Chavoushi et al., 2021). SMEs actively search for specialized knowledge and technology through formal collaboration, including joint ventures and international partnerships, as the director of Delta explains: "*We have a company in England with which we started a joint venture. We have a joint venture in the US. And we might want to set up a GNBA, so that is 3. So, we are going to look for cooperation with different areas in Europe and America."*

Professional networks and industry associations also played a crucial role, providing structured opportunities for knowledge sharing and exposure to emerging trends and innovations (Van de Vrande et al., 2009). Senior managers frequently participated in these networks, interacting with peers, experts, and policymakers to stay informed about technological and regulatory developments. Active participation leverages the strength of weak ties to access diverse ideas, resources, and perspectives, enhancing awareness of emerging opportunities across various domains (Shum & Lin, 2010). The Chief Marketing Officer of Gamma emphasizes the importance of such interactions: "*Yes, both . . . the CEO is in a top team of high–tech systems and materials. He currently has the small and medium enterprise section within economic affairs. He has a say in that, sitting at the table with professors, in the field of*

innovation. Setting up extra funding. So also, with different experts who consult him because he can express an opinion. On the other hand, we have the CTO, who is the chairman of the industry organisation for composites." While these network activities may appear similar to scanning, they are distinguished by their purposive character, that is firms engage these networks not for broad environmental awareness but to address specific knowledge gaps identified through prior scanning activities.

International trade fairs and site visits constituted another important search mechanism (Shum & Lin, 2010). SMEs used these settings to observe new technologies in use, engage with practitioners, and assess potential applications within their own operations. As the R&D manager of Epsilon describes: "*Actually, everything is allowed. Also, trade fair visits or something like that. I wanted to go to a big meat fair in Germany recently, because there are a lot of hygiene requirements there that are increasingly being applied to cookies, etc."*

Physical visits and demonstrations are also frequently used by the SMEs to acquire new knowledge. An example of this is a visit to a concrete factory to explore innovative applications: "*I am going with the Main Business Officer and another guy from the warehouse to, in about 2/3 weeks, to a concrete factory. They have VR glasses . . . we are really going to look at the factory and listen to the people working there to hear how they experience it. So, I am curious, maybe it will be something."*

Such experiences allowed SMEs to identify relevant patterns in new technologies, understand their applications, and explore ways to integrate them into their operations. Searching was further supported by participation in publicly funded innovation projects and by reliance on external experts. Financial support reduced costs of experimentation while consultants and informal contacts provided access to highly specialized knowledge: "*Yes, it is like that, my partner has an uncle. And he works in windmills. And we talked about (product as a service) a few years ago. And he was working at a company that also calculated payments per kilowatt"* (Owner/Theta).

Customer proximity emerged as a particularly salient source of target search. Trust–based relationships and frequent interaction enabled SMEs to capture fine–grained feedback and subtle shifts in customer needs. Managers often described being close to the customer as essential for identifying development opportunities and translating customer signals directly into product or service innovations: "*All signals from the market come back to us, and we have managers who process the feedback into the construction*" (R&D manager/Epsilon).

Hence, directors and managers frequently engage directly with customers: *"As a director, there is really only one position: close to the customer. I want to know what drives him, where he has problems, and where he seeks innovation"* (Owner/Epsilon).

In several cases, customer inquiries directly triggered new product development initiatives: "*One of the developments that we partly initiated due to demand, but also partly on our own initiative, is the bucket stacker. There was basically nothing for it in the European market, but there was demand*" (Owner/Nu). These findings illustrate how customer proximity and dialogue, early–stage customer involvement, supplier and industry collaboration, external expertise and consultations, international market connections, and trade visits and demonstrations collectively form the microfoundations of organizational searching within the alertness capability.

These findings extend existing research on entrepreneurial alertness by demonstrating how searching operates as an organizational capability rather than solely as an individual cognitive process (Araujo et al., 2023). While prior studies emphasize social networks and individual information processing (Ardichvili et al., 2003; Kadile & Biraglia, 2022; Nikraftar & Hosseini, 2016), the results show that organizational networks, institutional memberships, and customer relationships systematically enable firm–level alertness. Thus, by shifting the unit of analysis from the individual entrepreneur to the firm, we position alertness as an organizational capability that emerges through continuous scanning and searching for unmet opportunities (Araujo et al., 2023; Sharma, 2019). Importantly, while alertness in the Kirznerian tradition is non–deliberate at the individual level, these organizational searching practices illustrate how firms can cultivate the conditions under which alertness is more likely to arise and be acted upon, without manufacturing it artificially (Felin et al., 2015; Kirzner, 1973).

Responsiveness

Based on the findings, we define responsiveness as the firm's capability to rapidly interpret, and act upon environmental stimuli and market signals in a timely and effective manner to advance emerging opportunities (Garrett et al., 2009; Khan & Khan, 2021; Wei et al., 2014). The findings reveal two distinct microfoundations of responsiveness: evaluating and coping. Table 4 provides illustrative interview quotes. Evaluating reflects the firm's capacity to rapidly assess the viability and strategic fit of identified opportunities, while coping reflects the firm's capacity to mobilize resources and act swiftly once an opportunity has been assessed.

Evaluating

Recognizing an opportunity does not imply that a firm can profitably exploit it (Kirzner, 1973; McMullen & Shepherd, 2006; Tang et al., 2012). Firms need to evaluate the opportunity that arises from new information (Tang et al., 2012). The findings show that SMEs navigate this evaluation process through

Table 4. Responsiveness.

Representative Supporting Data for Each 2nd Order Theme	
Evaluating	• You learn an incredible amount from customer. You learn from every customer. Not from a new market, that is a blind spot. We know aerospace like the back of our hand. But consumer electronics, mass transportation, industrial, we do not know about those. (Commercial director/Gamma) • We position ourselves as a knowledge partner in horticulture, and that is the added value, so not just responding to the customer with we want 60 trailers. No, I would rather go to that customer and say, he thinks 60, and he will be excited when I can say that it can be 40. (Director/Kappa) • No, not yet, well, at least that you can read out what the machine has done. I think that is important; I think the next step is also that you need to look much more at those machines. That you also need to ensure they can see with cameras, that is not something we do ourselves, but at least that you can monitor the crop and monitor growth, but also monitor pests that are in the crop that you do not want, and based on that, take action to carry out pest control. (Sales manager/Lambda) • I am thinking about a web–shop, a portal where they can order their parts, instead of requesting them through service. To make all of that a bit friendlier, faster, and easier for our customers. I think there are still opportunities there (Owner/Nu) • We have those technical developments, of course, that are necessary. Because of that, we do respond by offering retrofit solutions. So, we come up with a solution for that, we develop it, and then we bring it to the market. We have also done that locally. We do respond to that. (Business development manager/Zeta)
Coping	• Yes, internally I think that is actually because we are a small company, it goes faster. (Owner/Theta) • If you look at what I just said about those fast–track projects: I think that is the right example of innovating within Zeta, because all kinds of projects are being proposed. Some go through; some do not. They are proposed from our own initiative, not from the board or anything. On–site. (Project support assistant/Zeta) • Well, it is really a sketch on a beer coaster that the owner then draws: the angle. It is indeed also idea development and concept development at R&D, because the sketch will not just work (R&D manager/Epsilon) • Then there is someone who says, "It is my idea, so I want it". Then the rest might say, "Yes, it is a good idea, but we have enough other things right now that are also quite interesting". That happens sometimes. We have more ideas than we have time for execution (Delta/Manager Engineering) • We actually want to start selling a bit of service proactively instead of it just coming by accident (Service manager/Kappa)

targeted differentiation and rapid decision–making. Due to their size, SMEs often succeed by concentrating their efforts in specific areas where they can develop specialized knowledge (Heider et al., 2021).

The SMEs demonstrate a clear focus on particular markets, products, and services. The owner of Epsilon emphasizes this focus, stating, "*When an entrepreneur asks me what the most important thing you have ever done, then it is focus, focus, focus. And for us, it is cookies, biscuits, crackers. Nothing else.*" (Owner/Epsilon). Maintaining a narrow focus not only helps in upholding high standards but also allows the SMEs to filter the opportunities and transition into decisive actions faster. The commercial director of Gamma describes this process: "*I absorb the customer request, and we feel at a certain moment, here is a gap, an opportunity, let us develop towards that.*" At Epsilon, action–oriented behavior is seen as a crucial driver for progress: "*Let's first try it. Behind your desk, you can't reason it. Behind your desk, nothing works. You have to try, let me show you that it does not work. So, I always try to trigger them to get out of their comfort zone and just try something*" (Ower/Epsilon).

The R&D manager of Epsilon also highlights the practical insights that arise from this approach: "*Servitisation, we do make attempts at it, but we immediately discover gaps in the system; it is not right or it does not work.*" This emphasizes how immediate action allows organizations to spot gaps and inefficiencies quickly and identify pathways to technological opportunities (Kirzner, 1983). Pragmatic thinking also plays a key role in decision–making within the SMEs. At Delta, ideas are assessed at an early stage to determine if they are worth developing further: "*Initially, that of course goes quite pragmatically. Then you can already roughly see if this is where we, that it makes sense to work it out further*" (Manager engineering/Delta).

These findings illustrate how niche focus and specialization, market and customer base analysis, rapid decision–making, and pragmatic prioritization collectively form the microfoundations of evaluating, enabling SMEs to quickly filter and assess viable opportunities within the responsiveness capability. This process extends the concept of responsiveness by framing it not merely as a reactive capability but as an interpretative, opportunity–assessing process grounded in proactive sensemaking and selective attention to the market environment (Garrett et al., 2009; Luu, 2017; Wei et al., 2014). This evaluative process is consistent with the Kirznerian logic that SMEs assess opportunities at low cost through direct market engagement and pragmatic experimentation rather than through resource–intensive formal analysis (Kirzner, 1973; McCaffrey, 2014).

Coping

Once an opportunity has been evaluated and decided upon, SMEs act immediately. Rather than deliberating further, they employ rapid prototyping and trial–and–error experimentation to test new ideas quickly and efficiently without large upfront investments. For instance, the use of testing facilities, such as labs where concepts are tested, allows the SMEs to experiment without large upfront investments. As the owner of Delta describes: "*A lab or small lab where we test our insulation in ovens and in boilers . . . that is often trial and error.*"

Similarly, rapid prototypes are used to test concepts quickly: "*That is rapid prototyping, yes. And it was also nice that that intern was still there, you know, because the sales manager, he was driving back from Belgium and he had that thing in his head and he says, Thomas, Thomas, you have to stay for a moment, we're going to draw for a bit. So, Thomas immediately started sketching, and the next day he took that thing to the flesh cutter, cut it, sewed everything together in the sewing department with the ladies there, like how would you do this and how would you do that, and that happens in one day, so to speak*" (Owner/Delta).

This helps the SMEs to evaluate opportunities efficiently before committing resources to full–scale production. After iterative testing, SMEs frequently collect customer feedback early, which enables them to refine their products and respond more quickly to new demands: "*If it is a prototype for a customer,*

it is sent to a customer or taken along. Feedback is collected. It is important to do that early to avoid getting stuck in a project that a customer has nothing to gain from. If it is for us, it is self–evaluating and seeing how we proceed from there to the next prototype or not" (Manager engineering/Delta).

Moreover, prototypes are continuously adjusted based on customer feedback, a process that keeps products evolving to better meet customer expectations. As the owner of Alpha explains: "*Well, then you reach a moment when there is a prototype. That prototype has gone to the customer. And the customer has started testing with it. And of course, all kinds of questions come from that, also problems. And we try to solve those problems for the prototype again. And yes, it continues like that. And when it is brought to the market, new problems arise again."* The findings reveal that SMEs are particularly proficient at maintaining close relationships with customers, since it allows them to refine their offerings in real time. Visualizing ideas and actively involving customers is another key strategy used by the SMEs. As the owner of Xi describes: "*Good, that is among other things trying to implement the things that make tangible what you are doing, because that gives the customer, of course, a much more visual story than just talking. And trying to approach the customer in such a way that they are willing to go along with you."*

Beyond planned prototyping, SMEs also demonstrate spontaneous capacity when unexpected opportunities or threats emerge, leveraging their organizational agility and flat structures to respond immediately through ad–hoc problem solving. In such cases, ad–hoc problem solving occurs: "*Sometimes the customer comes with something that is not good enough, then we improve it. Okay, it works well, then the next customer can use it too. That is something that continues"* (Manager of Engineering/Delta). This quote illustrates how SMEs respond to customer feedback by integrating it into their solutions and by further using it as an opportunity to scale to other customers.

The SMEs further benefit from improvisation and a flat organizational structure to enable this quick responsiveness. As the owner of Alpha explains: "*I find that the relatively small scale of Alpha as an organisation gives me the possibilities to move quickly and respond to new opportunities. Especially in the commercial field, and when you know that you are also supported by an excellent technical team. Who also really get things done. Then you can make very beautiful steps very quickly. And that, I think, is what drives me the most."* The Co–owner elaborates further on this: "*You want to work with a fixed core team, you want to have flexibility, you must know how to shape yourself like a piece of rubber around the customer. And that is only possible in the way we are doing it now."*

These findings illustrate how rapid prototyping and experimentation, co–development with customers and partners, fast–track innovation projects, internal idea mobilization, and proactive service development collectively constitute the microfoundations of coping within the responsiveness

capability and illustrate that responsiveness is not merely about reacting to market signals but also about engaging in continuous learning and customer co–creation, where feedback loops generate and refine opportunities (Garrett et al., 2009; Homburg et al., 2007). Thus, these findings not only highlight the firm's microfoundations to manage emerging opportunities but also emphasize how their practices transform opportunities into viable innovations. These insights offer a microfoundational understanding of responsiveness (Felin et al., 2015; Teece, 2007), thereby advancing the discussion beyond viewing responsiveness as a static, aggregated capability, toward explaining how it is enacted through concrete actions and processes in SMEs (Homburg et al., 2007; Luu, 2017; Wei et al., 2014). Critically, this enactment of coping operates at far lower resource thresholds than the seizing dimension of DC theory, consistent with the Kirznerian logic that SMEs mobilize and act on opportunities through improvisation and rapid experimentation rather than through large–scale resource commitment (Kirzner, 1973; McCaffrey, 2014).

Resilience

Based on the findings, we define resilience as the firm's ability to anticipate, respond to, and learn from opportunities in dynamic environments (Duchek, 2020; Zhang et al., 2023). Resilience typically manifests in two forms. The first is bounce–back resilience, which concerns an organization's ability to handle disruptions, absorb their impact, and quickly return to normal performance levels (Horne & Orr, 1998; Zhou et al., 2023). In contrast, bounce–forward resilience emphasizes an organization's capacity to learn from adversity, develop new capabilities, and leverage unexpected disruptions and challenges for improvement and growth (Bhamra et al., 2011; Hamel & Valikangas, 2003; Lengnick–Hall et al., 2011; Zhou et al., 2023). The findings reveal that SMEs enact resilience not only in response to disruptions but also in an opportunity–oriented manner, anticipating and adjusting to emerging opportunities rather than merely recovering from disruptions. While this distinction captures the reactive dimension of resilience, the analysis shows that SMEs also enact resilience in a proactive, opportunity–oriented manner that extends beyond disruption management. As such two microfoundations of opportunity–oriented resilience can be identified: preparing and adjusting. Preparing reflects the firm's proactive efforts to build flexible capacity and anticipate future opportunities, while adjusting reflects the firm's capacity to restructure, integrate, and recalibrate in response to emerging developments. Table 5 provides illustrative interview quotes.

Preparing

To be prepared for new opportunities, SMEs execute a variety of activities. They focus on process optimization and efficiency improvements to streamline internal workflows. The manager of Engineering of Delta describes their

Table 5. Illustrative findings on resilience.

Representative Supporting Data for Each 2nd Order Theme	
Preparing	• We have developed movable units so that you can easily set it up in one place (Co–owner/Theta) • We have a session twice a year with the co–owner and with the account manager and sales manager. We sit together with the four of us, and then we basically just discuss the headlines of the new products. Things that we have in development come up, trade fairs where we want to present a new product, and so on. And we try to somewhat align everything. That is the platform where, at that moment, we sometimes come up with new ideas together but also keep each other informed, what are we actually working on right now? (Owner/Alpha) • What it comes down to is that we are going to update the software. The reason why a party buys these machines is not so much the hardware, it just needs to work. If it does not work, there is a problem. What matters is: these are all machines that program themselves. (Owner/Gamma) • A lot is changing. We are making a huge catch–up on professionalization. It is actually going too fast for a company that originally started as a family business. People are leaving, new people are coming in. We are now scaling down, and then temporary workers are coming in, a flexible layer. I can hardly keep up with it; the production is of course still going on. (Production manager/Delta) • That is just a resources situation. The things are being freed up that are needed to grow the business by 40–60%. (Marketing director/Gamma)
Adjusting	• Basically, we already have a service offering for a number of products, and we are now trying to actually implement and sell it. (Director Innovation/Eta) • Well, the very first action we took is that we told our friendly terminals, etc.: "May we deliver a spreader to you with smart sensors?" (Owner/Iota) • Yes, we really want to make that transition from a technically driven to a sales–driven organization. But that is very difficult. That is why we also made a change in the structure this year, we have now separated operations and sales (HR manager/Zeta) • We have created a sort of working group with people. About the scissors, the big scissors we have here: What do we need to do to make that thing work seven hours a day instead of six hours a day, without it costing extra money or time? (Production leader/Beta)

efforts to prepare for new customer projects of different complexity: "*I am busy making a kind of order intake form for the customer projects, where we already look beforehand. As a figure of speech, take it off the shelf and make some adjustments, or is it really a large, impactful project? And then also take that into account before we start the project.*" Similarly, the main business officer of Beta shares: "*We did make a list; we called it the low–hanging fruit, things we can easily pick to make improvements. That is happening. And we are looking with those guys at what could improve their work. What do you continuously run into? But those are things that, for us, are often arranged a bit in the hallways, how should I put it?*" referring to the identification and implementation of quick workflow improvements.

Investment in capabilities and resources also plays a crucial role in supporting future opportunities. For instance, Delta, has built its own sewing robot to increase demand: "*Yes, that also has to do with money because if you place that at a company, it is possible, but it will cost you 70 K or 100 K, so then we actually developed that sewing machine ourselves because we also have a lot of knowledge of sewing machines by now, we just made a sewing robot.*" And Zeta has invested €200,000 in spare parts to support the operation of a new service business model for ship motors: "*What we did do is develop a kind of product for England. It is an exchange system for parts to reduce repair times . . . we first*

tried to come up with a smart system for it. That we stock all the parts needed to build all the different configurations. In the end, we came to the conclusion that we would stock complete units and offer them on an exchange basis. We made an investment of almost two hundred thousand. We put down two hundred thousand worth of stock here, in complete units" (Sales manager/Zeta).

To maintain a competitive advantage, the SMEs also invest proactively in innovation and R&D, for instance, by integrating new technologies in products such as IoT: "*We are currently conducting a pilot to see what we can extract if we collect a large amount of information. Can we make predictions about expected maintenance? In addition, we are also working on IoT–related things. Especially, switch manufacturers are increasingly developing large switches with a lot of built–in functionality, even up to monitoring the quality of the voltage. These are all things for which you previously had to install separate devices in your switchboard, but now all that information can come directly from the switch itself via an internet cable, which is enough to read all that data"* (Owner/Theta).

SMEs optimize their production and procurement strategies to prepare for future opportunities by scaling up and expanding capacity. The Owner of Delta illustrates how this capacity building prepares firms for scaling: "*We are also developing a number of machines ourselves. Because we are going to scale up. With some products, we are already in the thousands, but the growth is coming at some point. Especially with new devices, you have a phasing–in period, which is, say, 200 per week, and at some point, the device catches on, and you go to thousands per month. And then suddenly, you are talking about hundreds of thousands per year."*

Continuous learning also plays an essential role for SMEs to maintain robustness and adaptability in dynamic markets. The SMEs approach this through experimenting, knowledge sharing, and trial–and–error. For instance, they experiment and test their products and services in real–world scenarios, adjusting based on feedback and performance. As the service manager at Kappa explains: "*We first made a prototype. So, we first created a sort of spraying robot, which already automatically drives through the path. So, we have already done that automatically with cameras on it, took pictures, and checked if it looks like this."* Knowledge sharing and cross–pollination are other key pillars of continuous learning. By exchanging knowledge between different sectors, companies stimulate innovation and growth.

As the owner of Alpha explains: *"I think that our strength at that point is the fact that we gain knowledge in one market and can apply it in the other market."* Learning through trial–and–error is a widely used approach by the SMEs in which technologies and processes are iteratively improved. This is illustrated by a respondent who says: *"We test our linings in ovens and in boilers, this is often trial and error. My brother then flies to China to see how it is made, but there is not a process behind it or something, no. There is more trial and error in it"* (Owner/Delta).

These findings show how experimenting, knowledge sharing, trial–and–error learning, resource optimization, technology adoption, and workflow experimentation collectively constitute the microfoundations of preparing within the resilience capability. They collectively reframe preparing as a forward–looking, opportunity–enabling capability rather than a defensive readiness for disruption. Duchek (2020) conceptualizes anticipation primarily as preparing for adverse change; however, the SMEs studied in this research enact these same anticipatory behaviors to proactively prepare for emerging opportunities rather than adverse change alone. This broadens the view of resilience from adaptive fit toward deliberately optimizing resources to capture potential opportunities (Lengnick–Hall & Beck, 2005, 2016). This proactive, opportunity–oriented form of preparing is consistent with the Kirznerian logic that SMEs sustain adaptability through incremental preparation and adjustment rather than through structural reconfiguration, building the conditions for future discovery rather than merely defending against disruption (Kirzner, 1973; McCaffrey, 2014).

Adjusting

Resilience is not only about being prepared for new opportunities but also about adapting to opportunities and leveraging change. SMEs adjust themselves in a variety of ways. An important form of adaptation is the rapid modification of products, as evidenced by the remark by the owner of Delta: "*No, that goes fairly easily. We are now with 70 people, and that is still quite easy. We can implement product changes fairly easily.*" Adjustments to products are regularly sold as prototypes to launching customers to accelerate innovation, as the commercial director of Gamma explains: "*The first solution is always a prototype, which is sold to a launching customer, and then it is refined. The next orders come from that. It is about sensing it as a natural flow. The flow is about how you go from a prototype to something standard, to improvement, to continuation. The only thing we know is such a line that you set out. We do it in half the time compared to another company. With us, that goes fairly fast.*" This structural reorientation is further illustrated at Zeta, where the transition from a technically driven to a sales–driven organization required deliberate role restructuring: "*Yes, we really want to make that transition from a technically driven to a sales–driven organisation . . . we have now separated operations and sales*" (HR manager/Zeta).

Moreover, to adjust, the SMEs restructure their teams and roles. For instance, Gamma has set up a business development team of five employees to strengthen its commercial approach during growth. Furthermore, Zeta points to the need for integration of new services within the organization: "*We naturally have our own service for Zeta engines. Now we are going to do the same, but for other parties. So, it is not . . . it does not disappear, it actually becomes the daily routine*" (Project assistant/Zeta). This quote highlights that

new services are not seen as separate elements but are integrated into the company's existing activities. SMEs proactively focus on both process and product innovation to enhance efficiency and reduce costs. As highlighted by a Manager of Engineering at Delta: "*Materials that, for example, are too expensive, or processes, can also be solved by making your product different. Or by coming up with a new product. It works both ways, we make our current product cheaper through process innovation and at the same time there is product innovation, to see if the product itself can be made cheaper but also better or, suitable for other markets?*" (Manager engineering/Delta).

These findings illustrate how restructuring and role adjustments, integration of new products and services, scaling and efficiency improvements, and tailoring collectively constitute the microfoundations of adjusting within the resilience capability. The findings regarding adjusting extend existing research on resilience by showing how SMEs enact adjusting as a proactive and opportunity–driven form of adaptation rather than a reactive recovery mechanism. In doing so, this study extends resilience research by reconceptualizing resilience as a capability for opportunity realization and readiness (Duchek, 2020; Lengnick–Hall & Beck, 2005, 2016; Zhou et al., 2023). This reconceptualization aligns with the Kirznerian logic that resilience in SMEs concerns sustaining adaptability through incremental adjustment rather than structural reconfiguration, enabling firms to continuously position themselves for future opportunity discovery (Kirzner, 1973; McCaffrey, 2014).

Interrelationship between discovery–driven capabilities

Alertness, responsiveness, and resilience are not isolated capabilities; rather, they are interrelated and collectively enhance the adaptability and competitiveness of SMEs. It was found that alertness strengthens SMEs' ability to respond more swiftly to emerging opportunities. This relationship is primarily reflected in how organizations perceive external signals and react to them quickly and effectively. Such interaction creates a speed advantage. For instance, at Zeta, alertness at the operational level plays a critical role in rapidly identifying customer needs and directly initiating solutions: "*Those diesel coolers, that is something we came up with, I believe. Which eventually gets adopted. These are ad hoc actions we come across at a customer, solve. Report to management that we thought of and solved it that way. Then it usually gets adopted or taken along*" (Business development/Zeta).

Responsiveness also strengthens resilience. We observed that SMEs often learn by doing–they test ideas quickly through prototyping, use customer feedback to refine their offerings, and enhance improvisation. These actions and interactions help them cope with both expected and unexpected opportunities and foster dynamic adjustments. A strong example of this interaction is described by the co–owner of Alpha: "*At Alpha, for instance, rapid*

prototyping cycles generated continuous customer feedback that was iteratively incorporated into product refinements, embedding learning directly into the execution process and building adaptive capacity over time." This shows not only the importance of quick actions but also how these actions lead to continuous adaptation and resilience.

Finally, the findings show that alertness plays a critical role in fostering resilience. Organizations that are able to pick up and interpret signals from their environment in a timely manner can respond proactively to changes and thereby increase their resilience. The owner of Epsilon illustrates this process by describing how continuously scanning market and customer movements is converted into concrete strategic actions, such as initiating targeted R&D projects: "*I have a lot of feeling with the market, I also think I sense that well, where is the industry moving in general, and where is the biscuit market moving, what are our customers doing, what are our customers looking for, what are our competitors doing? That is something I'm, well I will not say busy with all the time, but I translate that knowledge into R&D projects.*"

This demonstrates that alertness functions not merely as a perceptive capacity but as an active strategic capability that drives both responsive action and organizational resilience. Completing the loop, resilience also strengthens alertness by creating the organizational conditions such as flexible capacity, accumulated learning, and forward–looking preparation that make firms more receptive to emerging opportunity signals. SMEs that have built resilient practices are better positioned to notice and interpret weak environmental signals because they are not consumed by managing operational disruptions. This forward–looking orientation sustains the firm's continuous attention toward opportunity discovery, closing the loop between resilience and alertness. All in all, these findings demonstrate that discovery–driven capabilities are most consequential when enacted in combination. Alertness without responsiveness leaves opportunities unacted upon; responsiveness without resilience produces short–term gains without sustained adaptability; and resilience without alertness risks becoming inward–looking and disconnected from emerging market developments. It is the dynamic interplay among these three capabilities that enables SMEs to continuously discover, mobilize, and renew competitive advantage in resource–constrained environments. These interrelationships are examined in depth in the Discussion that follows.

Discussion

As outlined in Table 1 in Section 2.2, the distinctions between discovery–driven capabilities and DCs operate at three levels: (i) the locus of opportunities, (ii) the nature of learning, and (iii) the enactment of adaptation, each of which is elaborated empirically in the findings section. These distinctions, rooted in the Kirznerian logic of exogenous opportunity discovery, emergent

practice–based learning, and non–deliberate alertness cultivated through organizational conditions, are reflected in the structure and dynamics of the conceptual framework presented here (Figure 2). Building on the inductive findings, a conceptual framework is developed to explain how SMEs discover, mobilize, and adapt to opportunities in dynamic environments through a system of discovery–driven capabilities. Within this framework alertness, responsiveness, and resilience operate as interdependent organizational capabilities that jointly enable SMEs to discover, mobilize, and adapt to opportunities while renewing their competitive advantage.

First, alertness enables SMEs to identify signals, changes, and market imperfections that others overlook. Empirically, alertness is enacted through scanning and searching–SMEs monitor technological and regulatory developments, analyze customer and market trends, and actively engage external sources of information (e.g., supplier and industry collaborations, trade visits and demonstration, international market connections, funded innovation projects, and customer proximity and dialogue). Second, responsiveness converts insights into action. SMEs evaluate opportunities using selective attention and niche specialization, make rapid decisions, and prioritize pragmatically. They cope with selected opportunities through rapid prototyping, iterative refinement, ad–hoc problem–solving, and improvisation. Flat structures and open communication reduce coordination costs and support swift execution.

Third, resilience enables SMEs to prepare for and adjust to evolving conditions in ways that sustain and renew competitiveness. Preparing is reflected in

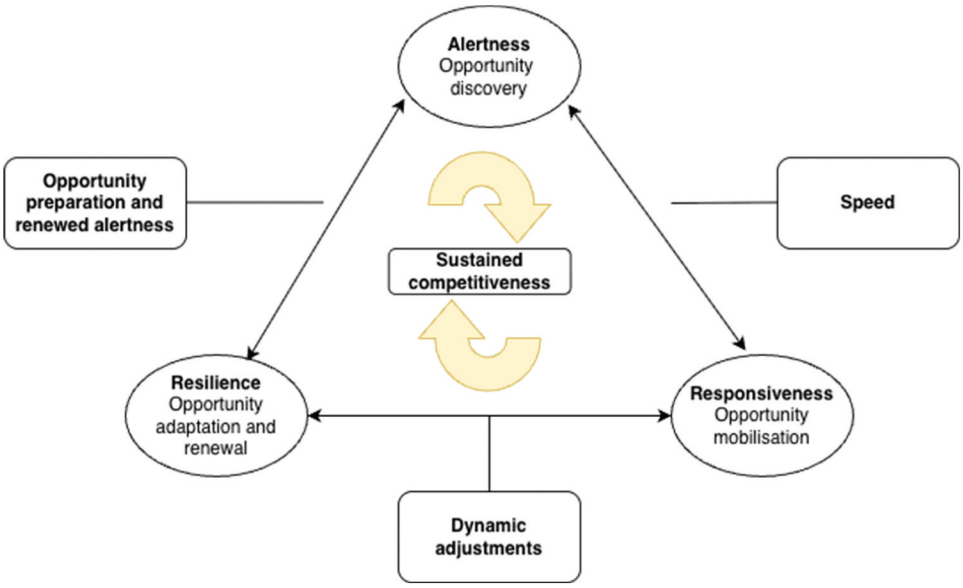


Figure 2. The Discovery–driven capabilities framework.

experimentation, trial–and–error learning, process optimization, capability investment, and capacity scaling. Adjusting involves rapid product tailoring, technology integration, restructuring teams and roles, and expanding their product/service offerings as opportunities mature. A central implication of the framework is that these capabilities are most consequential in interaction, and not in isolation. Alertness coupled with responsiveness generates a speed advantage by enabling rapid opportunity identification and early action. Responsiveness coupled with resilience supports dynamic adjustment by embedding learning and recalibration into execution. Alertness coupled with resilience strengthens opportunity preparation by enabling anticipatory action and continuous learning. This dynamic enables firms to better respond to previously undetected or emerging developments, while maintaining a proactive stance toward change.

Positioning relative to dynamic capabilities

Building on these distinctions, the discovery–driven capabilities framework diverges from DC theory (Eisenhardt & Martin, 2000; D. J. Teece et al., 1997) by shifting core assumptions about opportunity, learning, and scale. Most importantly, the perspectives differ in how opportunities are conceptualized. DC theory, rooted in the resource–based view and Schumpeterian innovation logic, treats opportunities as largely endogenous, created through internal resource reconfiguration (D. J. Teece et al., 1997; Pisano & Teece, 1994; D. Teece et al., 2016). In contrast, discovery–driven capabilities, grounded in Austrian economics and Kirznerian opportunity logic, treat opportunities as exogenous: they arise from environmental change and are discovered through organizational alertness (Alvarez & Barney, 2010; De Jong & Marsili, 2015; Kirzner, 1973; Tang et al., 2012). This reframes SMEs not as designers of industry change but as adaptive entrepreneurial actors that continuously engage with external shifts in the environment. The perspectives also differ in learning and capability development. DCs are typically portrayed as identifiable routines supported by structured learning and selection mechanisms (Eisenhardt & Martin, 2000). Even in high–velocity contexts, the emphasis remains on deliberate orchestration, albeit experiential and fragile (Eisenhardt & Martin, 2000; Di Stefano et al., 2014). In contrast, discovery–driven capabilities are emergent and practice–based, shaped through improvisation, trial–and–error learning, rapid prototyping, and ad–hoc problem–solving, modes that fit SMEs' resource constraints and time horizons (Winter, 2003). Also, the distinction of the focal unit of analysis should be considered. Discovery–driven capabilities explicitly take SMEs as their reference context, addressing a gap in theories that implicitly assume large, resource–rich firms (O'Connor, 2008). In doing so, the proposed framework provides a contextually appropriate lens for explaining competitiveness and adaptation

under constraints. The discovery–driven capabilities framework also requires positioning relative to the market orientation literature (Kohli & Jaworski, 1990; Narver & Slater, 1990), which shares several apparent similarities. Market orientation involves the organization–wide generation and dissemination of market intelligence and the coordinated responsiveness to it (Kohli & Jaworski, 1990). Narver and Slater (1990) further identify customer orientation, competitor orientation, and interfunctional coordination as its core components. The findings also reveal behavioral patterns such as customer proximity, network scanning, and rapid responsiveness that resemble these dimensions. However, the theoretical logics are distinct. Market orientation is primarily a strategic posture: a firm–level disposition toward generating and using market information to inform marketing decisions and deliver superior customer value (Narver & Slater, 1990).

Discovery–driven capabilities, by contrast, are theorized as a system of interrelated organizational capabilities operating at the micro–foundational level, explaining not just what SMEs attend to but how they enact discovery, mobilization, and adaptation as integrated behavioral processes (Felin et al., 2012; Teece, 2007). Market orientation may be understood as a precondition or antecedent that makes discovery–driven capabilities more actionable, but the two constructs operate at different levels of theorization (Day, 1994; Kohli & Jaworski, 1990; Vorhies & Morgan, 2005). Clarifying this relationship offers a direction for future research.

A further contribution of the proposed framework is its bridge function between the entrepreneurship literature and DC theory. Prior scholarship has treated these as largely separate domains. While entrepreneurship research focuses on opportunity recognition and exploitation by founders and early–stage ventures (Ardichvili et al., 2003; Shane & Venkataraman, 2000), DC theory explains how established firms reconfigure resources to sustain competitive advantage (D. J. Teece et al., 1997). This theoretical fragmentation leaves a gap in explaining how firms transition between these two modes as they grow (Arthurs & Busenitz, 2006; Lanza & Passarelli, 2014).

Discovery–driven capabilities address this gap by theorizing the intermediate stage: firms that have moved beyond purely individual entrepreneurial action but have not yet developed the resource base and routinization required for deliberate DC deployment. As SMEs formalize and scale, discovery–driven capabilities may create the organizational conditions – behavioral openness to the environment, accumulated market knowledge, and adaptive responsiveness – that over time enable the transition toward DC–type routines (Arthurs & Busenitz, 2006; Helfat & Peteraf, 2003; Zahra et al., 2006). In this sense, discovery–driven capabilities do not merely describe a static alternative to DCs; they describe a developmental trajectory through which the conditions for DCs are progressively constructed (Eisenhardt & Martin, 2000; Lanza & Passarelli, 2014; Nelson & Winter, 1982).

Theoretical contributions

This study makes two primary theoretical contributions, which build directly on the three theoretical distinctions – the locus of opportunities, the nature of learning, and the enactment of adaptation – by grounding each distinction empirically and extending its implications across the alertness, responsiveness, and resilience literatures.

First, the debate on whether SMEs possess DCs (Arend, 2014; Zahra et al., 2006) was carefully assessed and clarified. Prior work alternately argues that SMEs lack DCs due to resource constraints, short time horizons, and limited routinization (Arend, 2014; Delmar & Shane, 2003; Helfat & Peteraf, 2003; D. J. Teece et al., 1997; Mahoney, 2004; Sidney, 2003; Strotmann, 2007) or that they possess them in distinct forms (Arend, 2014; Arthurs & Busenitz, 2006; Branzei & Vertinsky, 2006; Zahra et al., 2006; Zollo & Winter, 2002). The findings bridge this tension by showing that SMEs develop capabilities for adaptation, but these are better conceptualized as discovery–driven and aligned with a Kirznerian opportunity logic rather than a Schumpeterian creation logic (Arend, 2014; Guerrero & Siegel, 2024; D. J. Teece et al., 1997; Pisano & Teece, 1994; Zahra et al., 2006).

Second, alertness, responsiveness, and resilience were extended by theorizing them as interdependent firm–level capabilities with identifiable microfoundations (Day, 1994; Duchek, 2020; Tang et al., 2012). Alertness has primarily been treated as an individual–level mechanism of opportunity recognition (Baron, 2006; McMullen & Shepherd, 2006; Tang et al., 2012). This research reconceptualizes alertness organizationally, enacted through shared scanning and searching practices (Araujo et al., 2023; Chavoushi et al., 2021; Shepherd, 2011). Responsiveness has been examined across service marketing (Day, 1994; Garrett et al., 2009; Kohli & Jaworski, 1990), supply chain (Agrawal, 2012; Bernardes & Hanna, 2009; Richey et al., 2022), and organizational research (Fuller & Russ–Eft, 2010; Liao et al., 2003; Verdu & Gómez-Gras, 2009) as the speed and extent of reaction to change (Garrett et al., 2009; Luu, 2017; Wei et al., 2014). This research extends this work by identifying two micro–foundations of responsiveness: evaluating, which precedes action through selective attention and rapid judgment, and coping, which enacts action through prototyping, improvisation, and feedback loops (Felin et al., 2015; Homburg et al., 2007; Luu, 2017; Teece, 2007; Wei et al., 2014).

Resilience is commonly defined as the capacity to absorb shocks and recover (Duchek, 2020; Lengnick–Hall & Beck, 2005, 2016; Zhou et al., 2023). This perspective has been studied from organizational (Conz & Magnani, 2020; Hillmann & Guenther, 2021), supply chain (Corrales–Estrada et al., 2021; Dittfeld et al., 2022; Shin & Park, 2021), and capabilities (Duchek, 2020; Parker & Ameen, 2018; Shin & Park, 2021). This research

extends resilience by identifying an opportunity–oriented dimension operationalized through preparing and adjusting, and by showing how resilience interacts dynamically with alertness and responsiveness, completing the loop through which SMEs continuously discover, mobilize, and renew competitive advantage in dynamic, resource–constrained environments (Duchek, 2020; Felin et al., 2015; Lengnick–Hall & Beck, 2005, 2016).

Managerial implications

This study offers several practical insights for directors and managers of SMEs operating in dynamic and resource–constrained environments. A first implication concerns how opportunities are detected. The findings suggest that effective opportunity discovery does not rely solely on the intuition or experience of individual owner–managers, but on the firm's ability to collectively remain alert to changes in its environment. Managers can strengthen this alertness by deliberately organizing for ongoing environmental monitoring without introducing heavy bureaucratic structures. For example, regularly discussing customer feedback, technological developments, and regulatory changes in short team meetings, or systematically reflecting on insights gained from trade fairs, site visits, and partner interactions, can help surface weak signals early. Actively participating in industry networks, partnerships, and customer relationships further increases exposure to new information and emerging trends. Importantly, these practices do not need to be formalized extensively; their effectiveness lies in being lightweight, recurring, and embedded in everyday managerial routines.

A second implication relates to how SMEs act on emerging opportunities once they are identified. The findings indicate that SMEs benefit from decision–making processes that prioritize speed and learning over analytical completeness. Directors and managers can support this by enabling rapid initial evaluations of whether an opportunity fits the firm's strategic focus, capabilities, and resource constraints. Rather than deferring decisions until uncertainty is resolved, managers can encourage teams to move quickly into low–cost experimentation, such as developing prototypes, pilot projects, or trial solutions with selected customers. Open communication channels and short decision lines are critical in this regard, as they reduce coordination costs and allow ideas to move swiftly from evaluation to action. By reserving limited but dedicated time and resources for experimentation, SMEs can generate valuable feedback early and avoid committing significant resources to unviable initiatives.

A third implication concerns building resilience in a way that supports future opportunities rather than merely protecting against disruptions. The findings show that resilience in SMEs is less about accumulating slack resources and more about developing flexible capacity and learning–oriented

practices. Managers can foster this by cultivating a culture in which experimentation, trial–and–error, and early customer involvement are seen as integral to normal operations. Investing in adaptable equipment, modular processes, and transferable skills enhances the firm's ability to adjust offerings and scale promising solutions as opportunities evolve. Equally important is the deliberate transfer of learning across projects and markets, so that insights gained in one context can inform action in others. In doing so, SME managers strengthen their firms' readiness to respond not only to unexpected challenges but also to emerging growth opportunities. These implications collectively suggest that sustained competitiveness in SMEs stems from managerial practices that continuously connect opportunity detection, rapid action, and adaptive learning. By embedding these practices into everyday decision–making, directors and managers can enhance their firms' ability to discover, mobilize, and renew opportunities despite persistent resource constraints.

While the above implications apply broadly across the SME category, their practical expression differs meaningfully by firm size, and practitioners should calibrate accordingly. For example, for micro–enterprises (fewer than 10 employees), the entire capability system typically resides in the owner–manager (Beaver & Prince, 2004; Storey, 1994). Alertness is highly personal: cultivating it means deliberately expanding one's exposure to diverse market information sources, attending industry events, and maintaining close customer dialogue rather than relying on formalized scanning routines. Responsiveness is enacted through rapid personal judgment and improvisation, and the key implication is to invest in basic decision–making heuristics and a small set of trusted advisors who can serve as rapid sounding boards. Resilience depends on maintaining flexibility through avoiding long–term commitments that lock in resources, and on building a small but reliable network of suppliers and partners who can be mobilized quickly.

For small firms (10–49 employees), the transition from purely individual alertness to team–level scanning becomes essential. Owners and directors should deliberately create forums, regular brief team meetings, customer feedback loops, or designated scanning roles that distribute alertness across key staff (Felin et al., 2012; Flatten et al., 2011; Shepherd et al., 2017). Responsiveness benefits from simple but formalized evaluation criteria to reduce coordination costs when opportunities arise (Eisenhardt & Martin, 2000; Ocasio, 1997). Resilience requires beginning to document and transfer learning across projects, so that adaptive capacity does not remain locked in single individuals (Zollo & Winter, 2002).

For medium–sized enterprises (50–249 employees), the priority shifts toward institutionalizing discovery–driven capabilities without compromising the entrepreneurial orientation that underpins them (Greiner, 1972; Stevenson & Jarillo, 2007). At this scale, alertness risks becoming siloed within functional departments (Ocasio, 1997; Tushman & Nadler, 1978). Cross–functional

communication structures, such as innovation task forces or joint customer review sessions, help to maintain the integrative scanning that characterizes effective alertness (Flatten et al., 2011; Teece, 2007). Responsiveness requires clear escalation pathways that allow promising opportunities to receive rapid authorization without excessive hierarchical delay (Eisenhardt, 1989; Stevenson & Jarillo, 2007). Resilience requires investing in modular capabilities, e.g., skills, equipment, and processes that are deliberately designed to be redeployed and in systematic learning reviews that translate project experience into reusable organizational knowledge (Sanchez, 1995; Zollo & Winter, 2002).

Limitations and future research

This qualitative inductive study supports theory building but constrains statistical generalizability. The research sample was purposively assembled and concentrated in Dutch manufacturing SMEs; patterns may differ in other sectors, institutional contexts, and regions (Gerring, 2006; Yin, 2017). The Dutch context deserves specific reflection as a potential boundary condition on the framework's transferability. The Netherlands offers a distinctive institutional environment for SMEs: a consensus–oriented business culture (the polder model) that facilitates inter–firm collaboration and network–based knowledge exchange; well–developed public R&D support mechanisms such as the WBSO tax credit for innovation and TechLeap; and a highly internationalized economy in which even small firms routinely operate across borders (CBS [Statistics Netherlands], 2023; OECD, 2022). These features may reinforce discovery–driven capabilities in specific ways: the prevalence of collaborative networks, for instance, may make the searching dimension more accessible in the Dutch context than in more fragmented or less collaborative institutional settings. Similarly, the high export orientation of the Dutch manufacturing SMEs may amplify alertness to international market signals in ways that differ from firms operating primarily in domestic markets. We do not claim that these features weaken the theoretical framework; the core logic of alertness, responsiveness, and resilience as discovery–driven capabilities should generalize across contexts, but researchers applying this framework in other institutional environments (e.g., transition economies, highly regulated sectors, or institutionally thin regions) should consider whether the enabling conditions observed in the Dutch manufacturing context are present or need to be theorized separately. Future research could explicitly compare discovery–driven capabilities across institutional contexts to establish the scope conditions of the framework.

Moreover, a related temporal boundary condition concerns the phased structure of the data collection. The primary generative wave was conducted in 2019, prior to the COVID–19 pandemic, in a relatively stable external environment. The capability behaviors observed in this wave therefore reflect

a pre–disruption context. The eight confirmatory cases collected in late 2021 and late 2022 were conducted during and immediately after the pandemic period, a context characterized by supply chain disruption, digital acceleration, remote work adoption, and heightened environmental volatility. We acknowledge that the capability patterns observed in 2019 may partly reflect the specific conditions of that period, and that a study conducted entirely in 2021–2022 might have surfaced different emphases within the framework, for instance, greater salience of resilience behaviors over alertness. However, we note that the confirmatory cases conducted in the pandemic and post–pandemic period validated rather than challenged the framework developed from the 2019 data. This cross–contextual confirmation is itself a meaningful empirical finding: it suggests that discovery–driven capabilities – alertness, responsiveness, and resilience – retain their explanatory power across contrasting environmental conditions, lending the framework greater robustness than a single–period study would afford. Future research should examine how the relative importance and enactment of each capability dimension shift across different phases of environmental stability and disruption.

Future research could also test the proposed framework across broader samples and industries, including service–based and digital SMEs, and evaluate boundary conditions. Several additional directions follow directly from our theorizing. For example, quantitative research could operationalize alertness, responsiveness, and resilience as firm–level constructs and test their complementarities and performance implications under varying levels of environmental dynamism and innovation requirements (O'Reilly & Tushman, 2008; Schilke, 2014; Schilke et al., 2018; Zimmermann & Birkinshaw, 2016). Researchers could examine when discovery–driven capabilities substitute for, precede, or complement DCs across growth stages and under competence–destroying versus competence–enhancing change (Arthurs & Busenitz, 2006; Lanza & Passarelli, 2014; Schilke, 2014; Tushman & Anderson, 1986; Zahra et al., 2006). Finally, future work could explore how SMEs balance opportunity discovery and exploitation across different governance and leadership configurations (e.g., owner–managed vs. professionally managed SMEs), and how these capabilities evolve as firms scale and formalize. These avenues would provide a holistic view of how these capabilities operate and contribute to SMEs' sustained competitiveness in dynamic, resource–constrained environments.

Conclusion

This study reframes SME adaptation by advancing a Kirznerian, opportunity–discovery explanation of how small firms sustain competitiveness under constraints. Rather than relying on routinized and resource–intensive DCs, SMEs compete through discovery–driven capabilities: alertness, responsiveness, and

resilience that collectively enable continuous opportunity recognition, rapid mobilization, and adaptive adjustment within resource–constrained environments.

The discovery–driven capabilities framework makes a twofold theoretical contribution. By grounding alertness, responsiveness, and resilience as interrelated microfoundations of firm–level discovery, it advances the debate over whether SMEs possess DCs by proposing that SMEs operate through a qualitatively distinct but theoretically coherent alternative. It further advances theory by demonstrating that these three capabilities are most consequential in interaction: alertness together with responsiveness generates a speed advantage; responsiveness together with resilience embeds learning into execution; and resilience together with alertness enables anticipatory action. These interactions form the dynamic logic through which SMEs transform environmental change into competitive advantage.

Beyond its theoretical contributions, the framework carries a broader implication for the field: the boundary between entrepreneurship research and DC theory need not be defined by firm size or resource endowment alone, but by the underlying logic of opportunity – whether opportunities are created or discovered. Discovery–driven capabilities occupy the theoretical space between individual entrepreneurial action and organizationally routinized DCs, describing the developmental trajectory through which the conditions for DCs are progressively constructed as SMEs grow and formalize.

Author contributions

CRediT: **Björn Rietdijk:** Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing; **Koen Dittrich:** Conceptualization, Supervision, Writing – original draft; **Erik-Jan Hultink:** Conceptualization, Supervision, Writing – original draft, Writing – review & editing; **Shahrokh Nikou:** Conceptualization, Data curation, Supervision, Visualization, Writing – original draft, Writing – review & editing.

Disclosure statement

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ORCID

Shahrokh Nikou http://orcid.org/0000-0002-0029-5852

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Appendices

Appendix A. SME characteristics

Company	Activities	Sector	# of FTEs	Year of Establishment
Alpha	Electrical Tech	Shipping	9	1983
Beta	Steelworks	Building	22	1997
Gamma	Machinery	Aerospace	147	2000
Delta	Gaskets & Insulation	Energy	70	1987
Epsilon	Machinery	Food	185	1976
Zeta	Machinery	Shipping	120	2009
Eta	Electrical construction installation	Marine	373	1959
Theta	Robotics	Agriculture	10	2018
Iota	Lifting equipment	Logistics	221	1977
Kappa	Agricultural tools	Agriculture	70	1997
Lambda	Metal construction work	Agriculture	20	1959
Mu	Offshore and onshore obstruction markings	Energy	163	1984
Nu	Machinery	Chemical	19	1994
Xi	Technical installations	Energy	15	1884

Note: Eta's headcount marginally exceeds the EU SME threshold of 249 employees (European Union Commission, 2003). Eta is retained as a boundary case; see Section 3.2 for full justification.

Appendix B. Company profiles

Company	Company description
Alpha	Alpha designs and manufactures high–quality electrical equipment, with a focus on transformer solutions for sectors such as shipping, offshore, medical applications, mechanical engineering and the industrial market. In addition, the company offers explosion–proof products according to ATEX and IECEx guidelines. With years of experience, Alpha is a point of contact for energy suppliers and distributors.
Beta	Beta is a committed and flexible supplier of certified steel products, with a focus on quality, fast delivery and cost reduction. The company supplies shipbuilding plates, construction plates and profiles, among other things. In addition, they offer services such as transport, preserving and cutting of steel.
Gamma	Gamma is a company focused on the automation and digitalization of composite production. They produce high–performance composite parts for industries such as aerospace, mobility, maritime and scientific research.
Delta	Delta has been delivering customized and innovative solutions for heat–intensive industries for over 35 years. As a market leader in high temperature sealing and insulation technology, Delta offers a wide range of gaskets and insulation solutions, including several patented products. The company focuses primarily on heating system manufacturers within the residential, commercial and industrial HVAC markets.
Epsilon	Epsilon is a total solutions provider for the food industry, specializing in systems that transport products from oven to packaging. They offer innovative and efficient solutions for feeding cookies. Their configurator allows customers to create customized solutions for their production lines.
Zeta	Zeta, offers maintenance, repair and original parts for engines, turbo machines and auxiliary systems, regardless of manufacturer. In addition, they supply environmentally friendly and reliable engines, propulsion systems and advanced SCR exhaust gas treatment solutions for ships, with the mission to promote sustainability in maritime technology.
Eta	Eta is a leading independent system integrator and innovator of electrical and automation systems in the maritime industry. They create common functionality between all electrical and automation systems on board vessels, with tailor–made, innovative solutions that meet the unique requirements of their customers. Their expertise and experience ensure that vessels operate to the highest standards of efficiency, safety and reliability.

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Company	Company description
Theta	Theta focuses on innovative solutions for process optimization in greenhouse horticulture. They develop customized systems, such as powered roller conveyors, tray robots, con robots, pick–up robots and buffer systems, that promote automation and enable capacity increases. This allows companies to work more efficiently and absorb labor shortages.
Iota	Iota founded is a family business specialized in the development and production of advanced spreaders and other hoisting and lifting equipment for the transshipment of sea containers, among other things. Iota produces container spreaders that are known for their quality, safety, durability and effectiveness.
Kappa	Kappa is specialized in the development and production of machines and systems for greenhouse horticulture. They offer solutions for crop care, crop protection, harvest & transport, data–driven systems and shed automation. Their products, such as pipe rail trolleys and electric tractors, improve the efficiency and productivity of growers worldwide. Kappa is known for innovation and reliability in the horticultural sector.
Lambda	Lambda, is an independent family business. It designs and manufactures crop care equipment and aluminum constructions for (glass) horticulture. Their products, such as sprayers and work platforms, optimize and make cultivation processes more sustainable. All steps, from 3D design to assembly, are carried out in–house.
Mu	Mu has been providing innovative marking and lighting solutions for safe operations. They offer helideck lighting, navigation aids, obstacle lighting and energy solutions for offshore, onshore and maritime applications. Their systems improve visibility and safety for aviation, shipping and infrastructure.
Nu	Nu, is a leading manufacturer of machines for packaging, destacking and palletizing products in the paint, sealant and chemical industry. Their product range includes fully automatic packaging machines, (de)palletizers and robots, and complete production lines for various products such as buckets, cans, bottles, sealant tubes and sausages.
Xi	Xi is a family business that has been active in the installation industry since 1884. They design and install building management systems, water pipes, central heating, and ventilation, with a focus on reducing energy consumption in homes and commercial buildings. Additionally, they develop innovative solutions, such as the DESY system for thermal disinfection of water pipes.