



Small steps for the big hit: A dynamic capabilities perspective on business networks and non-disruptive digital technologies in SMEs

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ABSTRACT

This study explores how small and medium-sized enterprises (SMEs) build on business networks to develop dynamic capabilities that ultimately foster the adoption of non-disruptive digital technologies (DT). Multiple mediation analysis is used to test this relationship, drawing on cross-industry secondary data from 1470 British SMEs. The results reveal that SMEs rely on business networks to support non-disruptive DT adoption. This relationship is mediated by the parallel effects of three dynamic capabilities (HR, strategic planning, and marketing capabilities). However, the results do not hold for each domain-specific dynamic capability. The mediating effect is particularly driven by marketing capabilities, while HR capabilities negatively affect DT adoption. These findings highlight the underlying mechanisms by which SMEs can enhance their adoption of non-disruptive DT in their daily operations and processes, which have the potential to strengthen their value proposition.

1. Introduction

The adoption of non-disruptive digital technology (DT) is the extent to which computer-based solutions are integrated into operational processes (Morgan-Thomas, 2016), such as promoting and selling goods and services. It strengthens an organization's value proposition and competitiveness (Soluk and Kammerlander, 2021; Wessel et al., 2021). Previous studies have emphasized the critical role played by DT adoption, especially in small and medium-sized enterprises (SMEs) (Mueller et al., 2018; Ramdani et al., 2013; Stock et al., 2022), which form the backbone of many economies worldwide (World Bank, 2021). Non-disruptive DT adoption enables SMEs that typically employ fewer than 250 employees (Cowling et al., 2015; Tiwasing and Sawang, 2022) to create and exploit new business opportunities, whilst maintaining the essence of their services and products (Furr et al., 2022; Furr and Shipilov, 2019; Kim and Mauborgne, 2019; Utterback and Acee, 2005; Wessel et al., 2021).

Although DT adoption brings with it considerable potential, the extent to which it is adopted varies substantially between SMEs (Chouki et al., 2020; Giotopoulos et al., 2017). Therefore, the question arises as

to why some SMEs have a greater ability to adopt non-disruptive DT, whilst others are less able. To adopt DT in operational processes, organizations require capabilities as leverage (Kane et al., 2015; van de Wetering, 2019). In this regard, dynamic capabilities theory offers a useful conceptual framework for understanding differences in non-disruptive DT adoption among SMEs (Teece, 2007; Teece, 2018b). Dynamic capabilities are an organization's "ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (Teece et al., 1997, p. 516). Recent attempts to explain the ways in which companies adapt to the challenges of DT adoption provide initial insights into the importance of dynamic capabilities (e.g., Eze and Chinedu-Eze, 2018; Ramdani et al., 2013; Yoo et al., 2012; Yoo et al., 2010).

Teece (2018a, p. 40), however, indicates the "need for future empirical work to flesh out the details," with regard to the role of dynamic capabilities. Although extant research suggests that dynamic capabilities positively impact firm innovation and transformation (e.g., Mikalef et al., 2019; Mikalef et al., 2021; Soluk et al., 2021b; Troise et al., 2022), research on the role of dynamic capabilities in using non-disruptive DT in operational processes remains limited. Previous studies

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have found that HR capabilities (Mäkelä et al., 2012; Truss et al., 2002), strategic planning capabilities (Wolf and Floyd, 2013), and marketing capabilities (Day, 2011; Soluk et al., 2021b) may have the potential to support and continuously improve an organization's functional activities; little is known, however, about their role in non-disruptive DT adoption.

In addition, the development of dynamic capabilities rests upon diverse internal and external prerequisites: for instance, an organization's flexibility, resource mix, or learning patterns (Eriksson, 2014; Rothaermel and Hess, 2007). Unsurprisingly, resource constraints, reputed to be particularly evident in SMEs (Corvello et al., 2022; De Massis et al., 2018; Denicolai et al., 2021; Eze and Chinedu-Eze, 2018; Mahto et al., 2018; Woschke et al., 2017), have been found to negatively affect the development of dynamic capabilities (Andren et al., 2003; Miyake and Nakano, 2007), thus hampering DT adoption (Kim et al., 2018). Previous studies have indicated that where internal resources are scarce, external networks are relevant as compensatory sources of resources (Albats et al., 2020; Corvello et al., 2022; Gassmann et al., 2010; Lee et al., 2010; Rothaermel and Hess, 2007) and external learning opportunities (Liu et al., 2022). Lack of internal expert knowledge affects small firms in particular (De Massis et al., 2018; Døving and Gooderham, 2008); partners may, however, play a major role in terms of sensing opportunities, since they are able to help identify unmet needs in the market (Ayuso et al., 2006). This leads to the following research question: *What is the role of domain-specific dynamic capabilities in the relationship between business networks and non-disruptive DT adoption?* Drawing on extant research on DT adoption in SMEs and dynamic capabilities theory (Teece et al., 1997), this study develops hypotheses and tests them, using cross-industry survey responses from 1470 British SMEs.

With this study, we aim to make at least three contributions. Firstly, we contribute to scholarly research on DT adoption in SMEs. In contrast to previous studies, which have focused on the performance outcomes of DT adoption (Bi et al., 2019), or obstacles to DT adoption (Chouki et al., 2020; Doe et al., 2022; Kotlar et al., 2013; Soluk and Kammerlander, 2021), we reveal the drivers of non-disruptive DT adoption in SMEs. In doing so, we extend the research stream, shedding light on how SMEs—typically constrained with regard to their financial and human resources (De Massis et al., 2018; Eze and Chinedu-Eze, 2018; Stock et al., 2022; Woschke et al., 2017)—can strengthen their business operations. Secondly, we contribute to research on dynamic capabilities theory (Barreto, 2010; Teece et al., 1997). Specifically, we provide novel insights into the mediating role of *domain-specific* dynamic capabilities (HR, strategic planning, and marketing capabilities) on non-disruptive DT adoption. With this, we go beyond existing research on dynamic capabilities theory, which often considers dynamic capabilities as a monolithic construct (e.g., Karimi and Walter, 2015), lacking a nuanced understanding of their multifaceted impact on DT adoption. Whilst existing research indicates that capabilities inherent in the functional domains of a company, such as HR systems (e.g., Truss et al., 2002), marketing (e.g., Day, 2011), and strategic planning (e.g., Hughes and Hodgkinson, 2021), are particularly relevant for firm renewal, we still lack in-depth empirical insights into the DT-related outcomes of those capabilities. We contribute toward closing this gap by revealing the vital role of marketing capabilities in positively mediating the relationship between SME membership in business networks and non-disruptive DT adoption. Thirdly, we extend previous research on external business networks in SMEs (Baú et al., 2019; Robson and Bennett, 2000; Zellweger et al., 2019). Looking beyond current research streams (Bi et al., 2019; Chouki et al., 2020; Soluk and Kammerlander, 2021), we demonstrate how resource-constrained SMEs build on external sources of knowledge, in order to develop dynamic capabilities through which non-disruptive DT adoption is fostered. With these insights, we extend previous knowledge about how SMEs must strengthen their collaborations with other organizations in order to continuously renew themselves (Kumar and van Dissel, 1996; Kroll and Schiller, 2010). Not only

do we show that business networks strengthen an SME's dynamic capability basis, but we also provide insights into which *specific* dynamic capabilities are crucial in this mediation.

2. Theoretical background

Teece et al. (1997, p. 516) define dynamic capabilities as “the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Dynamic capabilities thus reflect an organization's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions [...]”. Extant research differentiates dynamic capabilities from lower-order ordinary capabilities, which are routine business operations that allow each company to perform a defined set of activities (Teece, 2018a). Dynamic capabilities are a vital source of variance, in terms of why some organizations outperform others with regard to (technological) innovation output and adaptation (Crossan and Apaydin, 2010; Eisenhardt and Martin, 2000).

Despite increasing attempts to consolidate the dynamic capabilities literature in recent years, the understanding of the dynamic capabilities concept is, as it stands, still not entirely consistent (Pavlou and El Sawy, 2011; Peteraf et al., 2013; Schilke et al., 2018; Wilden and Gudergan, 2015). Reflecting on dynamic capabilities theory, Peteraf et al. (2013, p. 1389) state that there exist “not only different but contradictory understandings of the construct's core elements” (see also Argote and Ren, 2012; Danneels, 2008; Soluk et al., 2021b). A widely used approach to conceptualizing dynamic capabilities refers to the functional domain in which dynamic capabilities are developed and applied (Eisenhardt and Martin, 2000; Schilke et al., 2018). However, given the aforementioned inconsistencies in the literature on extant dynamic capabilities, there remains no consensus with regard to which domain-specific dynamic capabilities are of particular relevance for organizations to support their functional domains, respectively. Previous studies have repeatedly emphasized the importance of HR capabilities in leveraging HR and change practices, in order to enable continuous renewal (Mäkelä et al., 2012; Truss et al., 2002). We consider HR capabilities as a relevant form of *dynamic* capabilities, since they support to integrate, build, and reconfigure HR-related competencies (e.g., learning, reskilling, change), in the light of dynamic changes occurring in the HR domain (Khatri et al., 2017; Mäkelä et al., 2012). Previous research also points to strategic planning capabilities, to enable effective strategic decision-making (Wolf and Floyd, 2013) and marketing capabilities to utilize changing customer and market requirements (Day, 2011; Soluk et al., 2021b) to furnish competitive advantages for firms. We additionally consider strategic planning capabilities to be relevant *dynamic* capabilities; based on the integration and reconfiguration of knowledge and other resources, they allow for the strategic planning and decision-making that companies need, in order to navigate dynamic environments (Hughes and Hodgkinson, 2021; Wolf and Floyd, 2013). Similarly, marketing capabilities integrate, build, and reconfigure internal and external insights, utilizing them to draw conclusions about new (dynamic) market developments and customer needs (Day, 2011; Morgan et al., 2009; Wilden and Gudergan, 2015). As such, these three dynamic capabilities go beyond lower-order ordinary capabilities, which relate to limited operational activities in a firm (Teece, 2018a).

Although dynamic capabilities in large corporations have been intensively researched, scant attention has been paid to dynamic capabilities in SMEs (Hassani and Mosconi, 2022). This is surprising: SMEs are the backbone of economies worldwide (World Bank, 2021). Many SMEs lack financial and human resources (Corvello et al., 2022; de Groote et al., 2022; Woschke et al., 2017), and these resource constraints create challenges for the development of dynamic capabilities (Døving and Gooderham, 2008; Lu and Beamish, 2001). The limited size and equity-oriented financing of SMEs (as opposed to the debt-oriented financing of large companies) are reasons for these resource constraints (De Massis et al., 2018; Kaur et al., 2022). Whilst large

corporations can invest slack resources in their workforce, specialist knowledge, extensive strategy processes, and marketing plans, so as to develop dynamic capabilities, SMEs are considerably more limited in their ability to modify operations and rearrange activities (Arikan and Shenkar, 2022; van Burg et al., 2012). Since the development of dynamic capabilities is a complex process, companies usually require a certain amount of time, so the effort to develop dynamic capabilities requires a payoff in terms of time (Helfat and Martin, 2015; Schilke et al., 2018). In resource-constrained SMEs, this may lead to higher prioritization of day-to-day challenges in resource allocation, so as to ensure the survival of the company (De Massis et al., 2018; Soluk et al., 2021c). This limitation is critical for SMEs because dynamic capabilities lead to competitive advantages (Tiberius et al., 2021). Related to the adoption of DT, defined as “techniques, skills, and processes based on binary digits” (Soluk and Kammerlander, 2021, p. 2), previous research suggests that dynamic capabilities, in addition to other environmental factors such as societal influences (Chouki et al., 2020; Doe et al., 2022), are vital for SMEs to proceed in their digital transformation process (Soluk and Kammerlander, 2021).

Dynamic capabilities develop through knowledge processing, organizational learning, and “stable patterns of collective activity” (Chirico et al., 2012, p. 319), which materialize primarily in social relationships between individuals (Nahapiet and Ghoshal, 1998). The constraints of internally extant social relations in SMEs may lead these firms to seek external business networks as substitute sources of knowledge and learning (De Massis et al., 2018). These external sources of knowledge tend to be used in situations where the challenges facing an SME appear to be particularly complex and thus knowledge-intensive (Stock et al., 2022; Soluk and Kammerlander, 2021). In other words, in times of high environmental dynamism, SMEs are compelled to have a broad range of sources of knowledge at their disposal (Ahmed et al., 2022; Chouki et al., 2020). This insight is also in line with previous research on open innovation in SMEs, which has outlined the role of internal and external sources of knowledge as being essential for competitive advantages in SMEs (Dabić et al., 2019; De Marco et al., 2020; Hervas-Oliver et al., 2021; Kiessling et al., 2008). The literature on ecosystems is founded upon extant work on network ties and open innovation, and highlights how the idiosyncrasies of SMEs are accompanied by misalignments which, in turn, may cause challenges in the knowledge accumulation of resource-constrained SMEs (Andrade-Rojas et al., 2022; Doe et al., 2022; Radziwon and Bogers, 2019). However, the existing literature on open innovation and ecosystems remains inconsistent as to whether dynamic capabilities are an antecedent of openness or network ties (Köhler et al., 2022; Pundziene et al., 2022), whether dynamic capabilities and

openness or network ties are two parallel and concomitant constructs (Bogers et al., 2019), whether dynamic capabilities are an outcome of openness or network ties (Hutton et al., 2021), or whether openness or network ties are a dynamic capability in and of themselves. Whilst Soluk & Kammerlander (2021, p. 14) argue that “strategic partnerships” are a dynamic capability, Teece (2020, p. 23) perceives open innovation to be a “separate construct”. Although Schilke et al. (2018, p. 402) also hint at “interorganizational structure” as a possible antecedent of dynamic capabilities, in-depth knowledge is lacking about the role of external business networks in the development of dynamic capabilities, through which non-disruptive DT adoption may be nurtured in SMEs.

3. Hypotheses

The following explains how external business networks impact dynamic capabilities that act as internal mechanisms, through which non-disruptive DT adoption in SMEs is enhanced. The hypothesized effects are illustrated in Fig. 1.

3.1. Business networks and non-disruptive DT adoption

Non-disruptive DT adoption is crucial for SMEs that aim to improve their ability to compete with larger organizations (Nambisan, 2017; North et al., 2019; Ramdani et al., 2013; Soluk et al., 2021a). Its impact on SMEs is far-reaching, and difficult to comprehend (Nambisan et al., 2017; Ramdani et al., 2013; Yoo et al., 2012) because change does not take place merely in technological terms. DT adoption also entails new paradigms for management practice (Vial, 2019; Yoo et al., 2010), given the higher complexity associated with DT, as compared to “analogue” technologies. The constantly evolving nature of DT makes it impossible to be “done” with adoption; instead, multi-stage processes, iterative cycles, and continuous experimental processes are necessary, in order to make DT usable within a firm (Eze and Chinedu-Eze, 2018; Nambisan et al., 2017; Won and Park, 2020). Even if SMEs opt for non-disruptive DT, which differs from disruptive DT by not entailing a radical change in business operations but enhancing their efficiency and effectiveness, they must nevertheless implement incremental steps and gradual operational modifications over time, so as to strengthen their existing value proposition (Clauss et al., 2019; Furr and Shipilov, 2019).

The high level of complexity resulting from this incremental process makes non-disruptive DT adoption a knowledge-intensive endeavor (Hassan et al., 2021), requiring new competencies and expertise (Yeow et al., 2018). Due to resource constraints, SMEs are often unable to provide the necessary knowledge themselves (Stock et al., 2022). Their

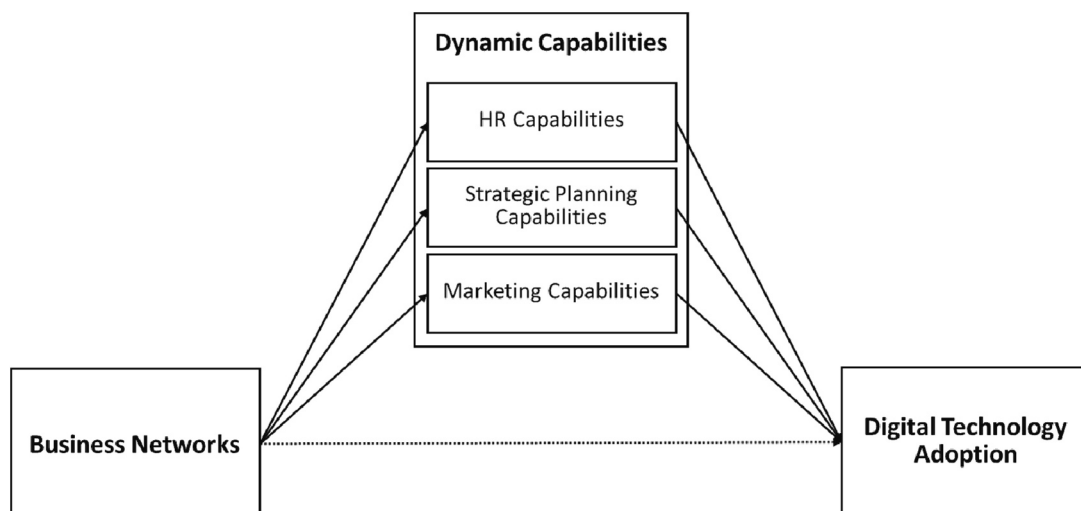


Fig. 1. Conceptual model and hypothesized effects.

limited size and lack of human and financial capital often impede them in the accumulation of such knowledge, based on their internal resources (De Massis et al., 2018; Mohd Salleh et al., 2017; Woschke et al., 2017). Networks can mitigate this effect and contribute to the generation and exploitation of knowledge for SMEs; for instance, in terms of conventional innovation, the role of formal and informal business networks is emphasized in SMEs (Albats et al., 2020; Lee et al., 2010). Due to SMEs' frequently high level of local embeddedness (Ribeiro-Soriano, 2017), these ties refer to membership in formal and informal networks and relationships with local business partners (including chambers of commerce and industry associations). External networks help to close knowledge gaps, and enable learning from the experiences of other organizations (Albats et al., 2020; Lee et al., 2010; Liu et al., 2022; Robson and Bennett, 2000), thus compensating for a lack of internal resources (Corvello et al., 2022; De Massis et al., 2018). Policymakers often support such networks, backing SME growth through (formal) institutions (Hottenrott and Lopes-Bento, 2014; Mina et al., 2021).

Despite its relevance, previous research has not addressed the relationship between SME membership of business networks and non-disruptive DT adoption. We expect that the complexity of non-disruptive DT adoption will lead SMEs to utilize existing business networks as external learning opportunities. Accordingly, we assert that the knowledge gained through the membership in these networks is exploited for non-disruptive DT adoption:

Hypothesis 1. Membership in business networks is positively related to SMEs' non-disruptive DT adoption.

3.2. The mediating effect of dynamic capabilities

Knowledge sourced from external business networks may effectively drive non-disruptive DT adoption, if an SME has the necessary dynamic capabilities to adapt and transform this knowledge into potentially value-creating processes (Otoo et al., 2021). Collis (1994) emphasizes the potential of dynamic capabilities for continuously improving an organization's operations and seizing opportunities for value creation. Dynamic capabilities are the underlying dynamics through which externally-sourced knowledge and internal operations are integrated, eventually enabling non-disruptive DT adoption in SMEs (Mohd Salleh et al., 2017; Schilke et al., 2018). We identify three domain-specific dynamic capabilities, which are dimensions of a firm's overall dynamic capabilities profile (Schilke et al., 2018). Together, they constitute a "firm's potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base" (Barreto, 2010, p. 271). Their combined potential shapes the relationship between SMEs' membership in business networks and non-disruptive DT adoption.

Firstly, *HR capabilities* are the links of human resource management "with the overall strategic direction of the organization, configuring human resources over time, and facilitating change and learning" (Mäkelä et al., 2012, p. 3; see also: Huselid et al., 1997; Truss et al., 2002)—given the substantially different competencies, human capital, and learning mechanisms underlying non-disruptive DT adoption in SMEs (Karimi and Walter, 2015; Yeow et al., 2018). They reflect the propensity of an SME to change its resource base (Barreto, 2010).

Secondly, *strategic planning capabilities*, which empower firms to plan, manage, and execute strategic decisions, are critical for the long-term performance of SMEs (Wolf and Floyd, 2013). They play a significant role in non-disruptive DT adoption, as they open up promising business opportunities, that are then assessed and exploited within the business (Bharadwaj, 2000; Nambisan, 2017). Briefly, strategic planning capabilities indicate an SME's propensity to detect opportunities and threats (Barreto, 2010).

Thirdly, *marketing capabilities* provide firms with insights into novel customer needs and new markets (Day, 2011; Morgan et al., 2009; Soluk

et al., 2021b). Marketing capabilities are instrumental in times of digital change (Abrell et al., 2016) because they support a firm's focus on customer-centricity. They reflect an SME's propensity to make timely and market-oriented decisions (Barreto, 2010) and are thus crucial for non-disruptive DT adoption.

In line with Barreto (2010), and Krasnikov and Jayachandran (2008), we assume a joint impact of these domain-specific dynamic capabilities, because they form the "ability of the organization to deploy resources in combination with organizational processes to obtain desired outcomes" (Mohd Salleh et al., 2017, p. 333). In brief, through their parallel effects, business networks nurture non-disruptive DT adoption in SMEs:

Hypothesis 2. The parallel effects of domain-specific dynamic capabilities positively mediate the relationship between SMEs' membership in business networks and non-disruptive DT adoption.

Depending on their dynamic capabilities profile, SMEs may place more or less emphasis on any of these domain-specific dynamic capabilities (Barreto, 2010; Schilke et al., 2018). Below, we look beyond their joint impact, explaining why they are crucial as parallel mediators in the relationship between business networks and DT adoption, and examine similarities and differences.

Firstly, existing membership in business networks enables decision-makers to exchange information about relevant competencies, developments in the labor market, and up-to-date requirements for the workforce. Exchange with peers and readily available experts within these networks makes these experiences tangible and these properties easy to adopt (Albats et al., 2020; Lee et al., 2010). This exchange is vital for SMEs because their limited human capital means that they have limited experience in this regard (De Massis et al., 2018; Woschke et al., 2017). Thus, we assume a positive relationship between business networks and HR capabilities in SMEs.

Secondly, higher degrees of HR capabilities lead SMEs to evaluate the constantly changing demands on employees and to draw the correct conclusions from them (Huselid et al., 1997). This is particularly relevant for the creation of novel competencies and learning mechanisms, required to support the SME's own DT adoption. Thus, through higher degrees of HR capabilities, business networks nurture DT adoption in SMEs:

Hypothesis 3a. HR capabilities positively mediate the relationship between SMEs' membership in business networks and non-disruptive DT adoption.

Likewise, active use of existing business networks enables SMEs to exchange examples of best practice with external partners, peers, and experts (Gassmann et al., 2010). The readily accessible information in a network can have implications for strategic decisions within the SME itself, such as introducing a new business model, or establishing a new business unit (Al-Debei and Avison, 2010; Caputo et al., 2021; Soluk et al., 2021b). Information from existing network partners allows SMEs to obtain easily accessible, honest feedback on early ideas (Duran et al., 2016). This feedback makes the exchange particularly relevant for SMEs. Because of resource constraints, they do not have access to notions of best practice from a wide range of business units or group subsidiaries (De Massis et al., 2018). Hence, we assume a positive link between existing business networks and strategic planning capabilities in SMEs.

Higher degrees of strategic planning capabilities provide SMEs with the opportunity to make profound entrepreneurial decisions, even in times of uncertainty (Teece et al., 1997; Wolf and Floyd, 2013). Strategic planning capabilities are, for example, a relevant factor in business model innovation processes, sometimes even depicted as strategic processes (Janssen et al., 2008), or at least as realized expressions of firm strategy (Casadesus-Masanell and Ricart, 2010). From the perspective of emergent strategies (Mintzberg and Waters, 1985), they allow for more experimentation on existing business models and, more importantly, for

better planning the subsequent necessary operational model and enterprise architecture modifications (Verhagen et al., 2021). Strategic planning capabilities are therefore not only important for value creation and value capturing, but essential for value delivery through operational modifications (Clauss, 2017). For these modifications in the operational model, such as alternative ways to execute processes (Solaimani et al., 2018), adoption of new (but not necessarily disruptive) digital technologies is crucial. In this sense, strategic planning capabilities help SMEs to adroitly manage entrepreneurial opportunities associated with DT adoption (Karimi and Walter, 2015; Yeow et al., 2018). Consequently, through strategic planning capabilities, business networks are positively related to DT adoption in SMEs:

Hypothesis 3b. Strategic planning capabilities positively mediate the relationship between SMEs' membership in business networks and non-disruptive DT adoption.

Marketing research emphasizes the value of market orientation for firm performance (Hult et al., 2005). Market orientation is the extent to which a firm engages in the generation of market intelligence pertaining, for example, to current and future customer needs (Kohli and Jaworski, 1990). Building on that premise, prior research demonstrates that exchange with existing network partners facilitates the acquisition of knowledge about new market developments (Chesbrough, 2003). Awareness of emerging customer needs and attractive new markets, based on the experience of network partners, is inherent to this knowledge exchange (Gassmann et al., 2010). This is vital for SMEs, as they might be restricted when conducting their own (formalized) market research due to resource constraints (De Massis et al., 2018). Knowledge sourced from existing network partners helps develop marketing capabilities that allow the creation of value through, for instance, customized product development, adjusted pricing, or targeted advertising in SMEs (Morgan et al., 2009). Marketing capabilities enable SMEs to reach new customers and enter new markets (Merrilees et al., 2011; Soluk et al., 2021b). They also allow SMEs to interact with volatile customer groups in unclear situations in changing markets (Fang and Zou, 2009; Morgan et al., 2009).

Subsequently, marketing capabilities foster DT adoption in SMEs, as ever-changing customer needs and evolving markets are inherent in digital technologies (Abrell et al., 2016). According to Day (2011), marketing capabilities should not be seen only as outside-in capabilities (such as utilizing customer needs), but also as inside-out capabilities (such as the implementation of operational processes so as to support effective customer care, information management, logistics, or distribution (Tatikonda and Montoya-Weiss, 2001). Unsurprisingly, empirical studies suggest a relationship between marketing capabilities and firm operations (e.g., Mu, 2017). For their execution, the use of non-disruptive DT is an essential prerequisite. Therefore, we assume that through marketing capabilities, existing business networks support non-disruptive DT adoption in SMEs:

Hypothesis 3c. Marketing capabilities positively mediate the relationship between SMEs' membership in business networks and non-disruptive DT adoption.

4. Methods

4.1. Data and empirical context

A secondary dataset was used, drawn from the 2014 edition of the British *Small Business Survey*, a large-scale survey of owners and managers of small UK businesses (with fewer than 250 employees) conducted by the Department for Business, Innovation and Skills (BIS, 2015).¹ The target population comprises all SMEs in the UK, and the survey applies computer-assisted telephone interviews and a stratified random sample selection method that reflects the 13 regions of the UK and SME size (as defined by the number of employees). This large-scale survey was completed by business owners and managers of SMEs with up to 249 employees, based across the four nations of the UK (England, Scotland, Northern Ireland, and Wales). It reflects the proportions of respondents equating to the population of businesses in terms of nation, size, and industry. The data can thus be viewed as representative of the population of SMEs in the UK.

Regarding the key variables in this study, the survey provides information on the extent to which SMEs use DT and the purposes they serve, their membership in networks and associations, and how the respondents perceive the capabilities of their SME. The survey allows for a relatively large sample size and rich information, which is an advantage outlined previously by other researchers drawing on *Small Business Survey* data (e.g., Idris and Saridakis, 2018; Thompson and Zang, 2020; Zhao and Thompson, 2019).

We used data referring to employers only (N = 4355, 1–249 employees). SMEs without employees, that is, operated by a single individual, or partners who did not employ any staff, were not included in the analysis, since we were interested in testing the effect of HR capabilities, among other effects. We excluded any cases with missing values, leading to a final sample of N = 1470 SMEs. Of these, 553 SMEs were micro-sized (1–9 employees), 561 were small-sized (10–49 employees), and 356 were medium-sized (50–249 employees). A total of 945 enterprises described themselves as “family businesses”. 978 SMEs were in England, 295 in Scotland, 155 in Northern Ireland, and 42 in Wales.

According to the categorization of the BIS (2015), the SMEs operated across several different sectors. Among them were 61 in agriculture/mining and utilities & waste, 208 in manufacturing, 145 in construction, 440 in retail & wholesale, transport & storage and food & accommodation, 65 in information/communications, 203 in finance, real estate and professional & scientific services, 122 in administrative services, and 226 in education, health, arts & recreation and other services. 33 businesses (2.2 %) were 0–1 years old, 75 businesses (5.1 %) 2–3 years, 90 businesses (6.1 %) 4–5 years, 221 businesses (15.0 %) 6–10 years, 341 businesses (23.2 %) 11–20 years, and 698 businesses (47.5 %) were >20 years old. Only 28.9 % were located in rural areas (urban: 71.1 %). Approximately 13.5 % of the SMEs were in the top 15 % of deprived areas of the country, that is, “places characterized by interconnected problems such as poverty, crime, persistent unemployment, limited services and large numbers of socially excluded individuals” (Lee et al., 2019, p. 534).

¹ We deliberately chose this edition of the annual *Small Business Survey* so as to rule out any potential biases caused by the UK referendum on membership of the European Union in 2016 (Zhao and Thompson, 2019). The political and economic uncertainty resulting from the public debate prior to the referendum, and the subsequent adjustment processes preceding the UK's eventual withdrawal from the European Union, may have led to delays in potentially irreversible long-term investments in, for example, digital technologies. This edition of the survey also includes items regarding capabilities. These items were removed from post-2015 editions. Finally, the survey items address the adoption of non-disruptive digital technologies, which take center stage in our study.

4.2. Variables and measures

The dependent variable is *DT adoption*. We used eight items (1 = yes, 0 = no) to build an index reflecting the extent of DT adoption in SME operations. Respondents were asked whether their business used DT (i.e., internet-based applications) for the following purposes: (1) customer interaction, (2) social media, (3) paying taxes, (4) seeking general business advice, (5) selling goods and services, (6) other online transactions, (7) promoting goods and services, and (8) advice on regulation. These items indicate the use of non-disruptive digital technologies that are likely to strengthen an SME's existing value proposition and operational processes (Furr and Shipilov, 2019; Kim and Mauborgne, 2019; Utterback and Acee, 2005; Wessel et al., 2021). They also illustrate that DT adoption is “a strategic choice from an array of alternatives” (Furr et al., 2022, p. 598).

As the independent variable, another index addresses membership of an SME in *business networks*. It includes three binary items capturing a firm's voluntary membership in a local chamber of commerce, and formal and informal business networks.² Respondents were asked whether they considered themselves to be part of a business network or a local chamber of commerce. Using this approach—and because of a lack of established operationalizations—we adapted prior measures for business networks in organizations (e.g., Bogers et al., 2018; De Noni et al., 2018; Faems et al., 2005; Idris and Saridakis, 2018). 391 businesses (26.6 %) were members of a local chamber of commerce, 539 (36.7 %) businesses participated in formal networks, and 461 (31.4 %) were members of informal networks. In the UK, membership in a local chamber of commerce is voluntary. Chambers of commerce are non-profit organizations, supporting businesses of all sizes, across all sectors; most members are SMEs. In rural areas, SMEs may opt against membership because of their geographical dispersion and diversity of sectors, which may make it difficult to agree upon common goals (Tiwasing and Sawang, 2022).

As parallel mediating variables in the analyses, we used three different survey items for each component of an SME's dynamic capabilities profile (Barreto, 2010), “so as to uncover similarities and differences between individual capabilities and analyze firms' dynamic capabilities profiles as a whole” (Schilke et al., 2018, p. 417). Respondents were asked to indicate on a five-point Likert scale how capable their business is in terms of managing personnel, developing and implementing a business plan and strategy, and entering new markets. These three single items were selected to measure the degrees of an SME's *HR capabilities*, *strategic planning capabilities*, and *marketing capabilities*. Although research on dynamic capabilities is not consistent in this regard (Schilke et al., 2018), we follow prior studies in their understanding that these domain-specific dynamic capabilities are vital for DT adoption, adapting their conceptualization of the domain-specific dynamic capabilities (Day, 2011; Khatri et al., 2017; Mäkelä et al., 2012; Morgan et al., 2009; Wolf and Floyd, 2013). While self-reported measures on the development of dynamic capabilities are increasingly used in scholarly work (Karimi and Walter, 2015; Soluk et al., 2021b), the survey items included in our study focus on the very core of the previously given definitions of the three dynamic capabilities, and thus also reflect the dynamic nature of these capabilities. This related, in particular, to the ability of these three capabilities to integrate, build, and reconfigure internal and external competencies and other resources in times of dynamic environments, as it is essential for managing personnel, developing and implementing a business plan and strategy, and entering new markets (Day, 2011; Hughes and Hodgkinson, 2021; Mäkelä et al., 2012).

² In the UK, membership in a local chamber of commerce is voluntary. The 53 accredited chambers of commerce across eleven regions in the UK are non-profit organizations (British Chambers, 2022), supporting businesses of all sizes, across all sectors; most members are SMEs.

We controlled for *size* (number of employees, logarithm), *industry* (1 = services and 0 = manufacturing),³ and *age* (1 = over 10 years and 0 = 0–10 years) (Decker and Günther, 2017; Giotopoulos et al., 2017). The value of dynamic capabilities is context-dependent (Collis, 1994). To reflect the context in which the British SMEs in our sample operate, we accounted for the impact of location, since geographically-bound social structures affect SMEs' growth and ability to collaborate and innovate (Baú et al., 2019; MacPherson and Holt, 2007; Street and Cameron, 2007). We controlled for SME location in urban versus rural areas, *England* versus the three other nations,⁴ and the country's top 15 % most deprived areas. Family owners are influential internal stakeholders who may hamper any implementation of innovative technologies that requires considerable effort and financial investment with uncertain outcomes (Decker and Günther, 2017). This uncertainty will likely dissuade family owners from investing in DT adoption because it might threaten their legacy. We included a binary variable indicating whether an SME describes itself as a *family business* (1 = yes and 0 = no) as another control variable (Tiwasing and Sawang, 2022).

Table 1 reports the means, standard deviations, and correlations. Multicollinearity is not an issue because the variance inflation factors are well below the critical threshold of five (Hutcheson and Sofroniou, 1999). The highest VIF value is 1.417 (*strategic planning capabilities*). The condition index is 22.783, thus below the critical threshold of 30.

4.3. Statistical analysis

The statistical software package SPSS 27 was used for analyses. We estimated ordinary least squares (OLS) regression models. Models 1–6 in Table 2 show the relationships between business networks, dynamic capabilities, and DT adoption. Model 1 tests the impact of the control variables on *DT adoption*. We then demonstrate the effect of *business networks* as an independent variable on *HR capabilities* (Model 2), *strategic planning capabilities* (Model 3), and *marketing capabilities* (Model 4). Model 5 tests the direct relationship between *business networks* and *DT adoption* as a dependent variable. Model 6 also includes *HR capabilities*, *strategic planning capabilities*, and *marketing capabilities*.

Researchers frequently apply the causal steps method suggested by Baron and Kenny (1986) when testing for mediating effects. This approach has been criticized for its low statistical power; moreover, it only provides conditions for the existence of a mediating effect, neither testing the potential indirect effect between independent and dependent variables through a mediator, nor providing an estimate of the magnitude of this indirect relationship (Rucker et al., 2011). Most significantly, it does not allow for analysis of the joint impact of multiple parallel mediators (MacKinnon et al., 2002; Preacher and Hayes, 2008), which is a central feature of our study, given that organizations rely on the combined impact of several dynamic capabilities (Barreto, 2010; Collis, 1994). We applied a bias-corrected bootstrapping method to mitigate these shortcomings; this offers a powerful statistical technique for testing mediation models with multiple mediators (Williams and MacKinnon, 2008). Drawing on Hayes (2013), we used the PROCESS

³ In line with Mellewigt et al. (2007), we aggregated the data into two categories: 1 = services (including retail & wholesale, transport & storage, food & accommodation, information/communications, finance, real estate, professional & scientific services, administrative services, education, health, arts & recreation, and other services) and 0 = manufacturing (including agriculture/mining, utilities & waste, manufacturing, and construction). This aggregation reduced the complexity of the analysis.

⁴ The UK comprises four nations, with Wales, Scotland and Northern Ireland being devolved nations, with separate legislatures and executives. In contrast, England does not have a devolved parliament; the UK Parliament and UK Government, which retain some powers across the UK, decide upon English laws and public services. The distinct legislatures and executives lead to differences in regional economic development, entrepreneurial initiatives, and business growth across the four nations.

Table 1
Descriptive statistics and correlations.

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1 DT adoption	0.706	0.245	1											
2 Business networks	0.315	0.318	0.275**	1										
3 HR capabilities	4.012	0.800	-0.035	0.005	1									
4 Strategic planning capabilities	3.765	0.950	0.105**	0.139**	0.421**	1								
5 Marketing capabilities	3.039	1.107	0.154**	0.115**	0.203**	0.383**	1							
6 Size	1.163	0.596	0.226**	0.238**	-0.043	0.131**	0.137**	1						
7 Industry	0.718	0.450	0.100**	0.062*	0.073**	0.089**	-0.004	0.028	1					
8 Age	0.715	0.452	0.004	0.055*	-0.053*	0.131**	-0.069**	0.161**	-0.090**	1				
9 England	0.665	0.472	0.133**	0.057*	-0.010	-0.001	0.030	0.013	0.110**	-0.033	1			
10 Urban	0.289	0.454	0.013	-0.104**	-0.024	-0.090**	-0.052*	-0.133**	-0.161**	0.020	-0.050	1		
11 Deprived	0.135	0.342	0.046	0.045	0.049	0.025	-0.034	0.043	0.036	0.016	0.011	-0.239**	1	
12 Family business	0.643	0.479	-0.107**	-0.131**	0.073**	-0.066*	-0.032	-0.210**	-0.091**	0.029	-0.002	0.118**	-0.045	1

Notes: N = 1470. Significance levels: ** p < 0.01, * p < 0.05.

macro for SPSS 27 (Model 4 for multiple parallel mediators, 5000 bootstraps, 95 % bias-corrected confidence intervals).⁵

5. Results

Table 2 presents the results of the OLS regressions. Model 1, the control model, shows that non-disruptive DT adoption is significantly driven by firm size (p < 0.001) and industry type (p < 0.01). The location of an SME in England also exerts a significant influence (p < 0.001), reflecting the higher economic development of England compared to the other three nations. Albeit only marginally significant and rather negligible, status as a family business (p < 0.05), as well as being situated in one of the most deprived areas of the UK (p < 0.10), inhibit non-disruptive DT adoption, whilst being based in a rural area nurtures it (p < 0.05). Regression models also show that business networks have no significant effect on HR capabilities (Model 2); they do, however, have positive and significant effects on strategic planning capabilities (Model 3, p < 0.001) and marketing capabilities (Model 4, p < 0.01). Model 5 shows that business networks are positively and significantly related to non-disruptive DT adoption (p < 0.001), supporting Hypothesis 1. This result remains stable if we include the mediating variables as additional predictors in Model 6. Surprisingly, HR capabilities have a negative and non-negligible direct effect on non-disruptive DT adoption (p < 0.01). Marketing capabilities are positively and significantly associated with non-disruptive DT adoption (p < 0.001). Strategic planning capabilities do not yield a significant result.

In terms of the control variables, the results hint at the existence of local effects. SMEs in England engage more with non-disruptive DT adoption than do their counterparts in Scotland, Wales, or Northern Ireland (p < 0.001). Likewise, non-disruptive DT adoption in SMEs in rural locations is higher than in SMEs in urban areas (p < 0.01). Though weakly and only marginally significant, SMEs in deprived areas are less likely to adopt non-disruptive DT than those located elsewhere.

Table 3 reports the results of the multiple mediator analysis. The PROCESS procedure confirms the findings from the OLS regression analysis that business networks support non-disruptive DT adoption. Both the total and direct effects are positive and significant. The value of the total effect is higher, indicating that the joint impact of the three domain-specific dynamic capabilities strengthens the relationship between business networks and non-disruptive DT adoption, as suggested by Hypothesis 2. However, there are differences between them as individual mediator variables. The results do not support the mediating effect of HR capabilities and strategic planning capabilities because the confidence intervals resulting from bootstrapping include zero (Zhao et al., 2010). Hypotheses 3a and 3b are not supported. Only the indirect effect for marketing capabilities is significant, supporting Hypothesis 3c.

As a robustness check, we initially used Harman's one-factor test (Podsakoff and Organ, 1986), which showed that five factors accounted for 58.05 % of the total variance; of this, the first factor explained 16.61 %. Subsequently, following Healey et al. (2015), we applied a marker variable technique recommended for cross-sectional, self-reported data. We selected an item unrelated to the dependent and predictor variables, considering whether red tape (that is, formal rules or standards that appear to be excessive, rigid or redundant) presented obstacles to the business's performance. We included this item in our regression models as an additional control variable (cf. Table 2, Model 7). All the coefficients that had been significant in the original models remained significant after controlling for the marker variable. Thus, our results are robust and cannot be attributed to common method variance.

⁵ According to Hayes et al. (2017), researchers increasingly forgo the procedure originally suggested by Baron and Kenny (1986), using instead PROCESS or SEM, which allow for a holistic perspective on mediation models. Hayes et al. (2017) demonstrate that both procedures lead to identical results.

Table 2
Regression analysis.

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>	<u>Model 6</u>	<u>Model 7</u>
Dependent variable	DT adoption	HR capabilities	strategic planning capabilities	marketing capabilities	DT adoption	DT adoption	DT adoption
Control variables							
Size	0.222***	-0.029	0.102***	0.131***	0.175***	0.156***	0.154***
Industry	0.084**	0.075**	0.067*	-0.028	0.076**	0.081**	0.081**
Age	-0.018	-0.046†	-0.051†	-0.095***	-0.025	-0.016	-0.019
England	0.124***	-0.021	-0.020	0.022	0.113***	0.110***	0.110***
Rural	0.059*	-0.012	-0.053†	-0.040	0.071**	0.077**	0.075**
Deprived	-0.048†	0.048†	0.001	-0.050†	-0.052*	-0.044†	-0.044†
Family business	-0.061*	0.081**	-0.017	0.010	-0.043†	-0.038	-0.040
Independent variable							
Business networks		0.018	0.107***	0.089**	0.227***	0.215***	0.215***
Mediating variables							
HR capabilities						-0.067**	-0.067*
Strategic planning capabilities						0.041	0.041
Marketing capabilities						0.102***	0.104***
Marker variable							
Red tape							0.028
R ²	0.085	0.018	0.042	0.039	0.133	0.146	0.147
Adjusted R ²	0.080	0.013	0.037	0.034	0.128	0.140	0.140
F	19.314***	3.360**	7.995***	7.420***	27.904***	22.744***	20.964***

Notes: N = 1470. Standardized regression coefficients are reported. † p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 3
Multiple mediation analysis – summary of bootstrapping results.

	Effect	Boot SE	p	LLCI	ULCI
Total effect of business networks on DT adoption	0.175	0.020	0.000	0.137	0.214
Direct effect of business networks on DT adoption	0.166	0.020	0.000	0.128	0.204
Indirect effect of business networks on DT adoption					
Total	0.010	0.004	0.003	0.003	0.018
Through HR capabilities alone	-0.001	0.002	-0.004	0.002	0.002
Through strategic planning capabilities alone	0.003	0.003	-0.001	0.009	0.009
Through marketing capabilities alone	0.007	0.003	0.002	0.014	0.014

Notes: N = 1470. The number of bootstrap samples for the bias-corrected intervals is 5000. 95 % bias-corrected confidence intervals and unstandardized coefficients are reported. CI = confidence interval, LL = lower level, UL = upper level. Covariates: size, industry, age, England, rural, deprived, family business.

6. Discussion

Overall, our findings illustrate that business networks and dynamic capabilities drive non-disruptive DT adoption in SMEs. They underline the importance of SME membership in diverse business networks for the development of domain-specific dynamic capabilities through which non-disruptive DT adoption can be fostered. We tested our conceptual framework based on a cross-industry sample of 1470 British SMEs; membership in business networks positively affects non-disruptive DT adoption. The parallel effects of three domain-specific dynamic capabilities jointly mediate this relationship. Surprisingly, and contrary to our theorizing, their mediating effect relies mainly on marketing capabilities. We found no empirical support for the separate mediating effects of HR capabilities or strategic planning capabilities. On disentangling the individual effects, we see a significant negative relationship between HR capabilities and non-disruptive DT adoption in SMEs. Non-disruptive DT adoption is likely to improve internal coordination, including owners' relationships and communication with their employees (e.g., Corvello et al., 2022). However, although they “may result crucial for creating a positive social climate for innovation” (Popa et al., 2022, p. 1616), HR capabilities are possibly not a direct precursor

of non-disruptive DT adoption.

6.1. Contributions to scholarly research

Our study unfolds important theoretical implications for scholarly research. Firstly, we contribute to the emerging debate on digital transformation and DT adoption within SMEs. Whilst previous research has emphasized the performance implications of (Bi et al., 2019), and obstacles to, (digital) technology adoption (Chouki et al., 2020; Doe et al., 2022; Kotlar et al., 2013) as well as digital transformation in SMEs (Soluk and Kammerlander, 2021), our insights are more nuanced. We add to the understanding of how SMEs, which tend to lack financial and human capital (De Massis et al., 2018; Eze and Chinedu-Eze, 2018; Stock et al., 2022; Woschke et al., 2017), are able to engage in activities that can strengthen their operations. Our findings extend the list of contextual factors (Chouki et al., 2020; Doe et al., 2022; Soluk, 2022), and internal and external actors involved in DT adoption suggested by, for instance, Ramdani et al. (2013) and Eze and Chinedu-Eze (2018), since we point to the impact of the membership in existing business networks as external sources of knowledge and learning opportunities (Liu et al., 2022). We thus extend previous research, which hints at the role of resource constraints and digital transformation or innovation behavior in SMEs (Mueller et al., 2018; North et al., 2019; Popa et al., 2022). Specifically, we provide evidence for the effectiveness of membership in external business networks in mitigating SMEs' resource constraints.

Secondly, we contribute to the dynamic capabilities research stream. We extend existing research on dynamic capabilities, which is mainly conceptual (e.g., Barreto, 2010; Teece et al., 1997), with an empirically profound investigation of the role of dynamic capabilities as parallel mediators in the relationship between business networks and non-disruptive DT adoption. Following Krasnikov and Jayachandran (2008), who recommend probing the complementary effects of different dynamic capabilities in empirical research, our study shows that SMEs rely on multiple capabilities simultaneously in non-disruptive DT adoption. By theorizing and testing the parallel and distinct effects of domain-specific dynamic capabilities, we contribute to the accumulation of a coherent knowledge of the role of individual dynamic capabilities (Schilke et al., 2018) in this situation, adding a degree of specificity to previous, relatively general claims about the importance of dynamic capabilities in the digital era (Yoo et al., 2012; Yoo et al., 2010). We emphasize the role of marketing capabilities as a mediator in the relationship between business networks and DT adoption, thus extending the previous conceptualization of this dynamic capability (Wolf and

Floyd, 2013).

Thirdly, we contribute to research streams on networks in SMEs (Bau et al., 2019; Robson and Bennett, 2000; Zellweger et al., 2019). Our study extends prior research by showing that membership in business networks can foster the development of dynamic capabilities, ultimately leading to increased DT adoption (Albats et al., 2020; North et al., 2019). We add to the SME literature on networks by highlighting the differences arising in the digital economy (e.g., compared to conventional innovation). With their positive relationships to dynamic capabilities in general, and strategic planning capabilities and marketing capabilities in particular (cf. Table 2), we emphasize that business networks drive individual dynamic capabilities in SMEs (Hassani and Mosconi, 2022; Soluk et al., 2021b). With these findings, we also contribute to so far inconsistent research on open innovation and ecosystems in SMEs, literature streams closely related to networks. Whilst previous studies on open innovation identified misalignments and other challenges deeply rooted in the idiosyncrasies of SMEs as obstacles to open innovation (De Marco et al., 2020; Hervás-Oliver et al., 2021; Radziwon and Bogers, 2019), we extend these insights by showing which specific network ties SMEs can rely on to reconfigure knowledge and learning, and to turn those into competitive advantages through DT adoption. In addition to extant knowledge in the ecosystem literature, we contribute to a more nuanced view of how SMEs can develop dynamic capabilities based on their ties to existing external network partners (Andrade-Rojas et al., 2022; Bakry et al., 2022).

6.2. Implications for management and policymaking

Our study also entails implications for management practice and policymaking. Firstly, we provide SME owners, managers, and advisors with insights into the underlying mechanisms of non-disruptive DT adoption by SMEs. Using data from the UK, our study illustrates that non-disruptive DT adoption in SMEs entails more than just embracing the technology. However, SMEs in the UK often lack the skills and capabilities to engage in DT adoption: “technology adoption isn't down to a lack of capacity or an inadequate appetite for innovation, but rather the challenges associated with adopting new technologies and the skills gaps within SMEs” (Be the Business, 2021, p. 7). Our findings reveal two factors that may help to overcome these challenges: business networks and dynamic capabilities. Even resource-constrained SMEs can strengthen these factors without engaging in prohibitively large investments by, for instance, participating in training events provided by local chambers of commerce or getting in touch with other members for informal knowledge exchange.

Secondly, although our findings draw on data from the UK, they have implications for policymaking worldwide. Governments are increasingly reliant on supporting SMEs to make them compatible with the digital economy, since many jobs and tax revenues depend on SMEs' performance (Hottenrott and Lopes-Bento, 2014; Mina et al., 2021). Our findings support the view that targeted government intervention in establishing new (or expanding existing) formal and informal business networks can help SMEs to further exploit these driving forces. For example, in the UK, SMEs in rural, geographically remote areas tend to be reluctant to join local chambers of commerce, which are mainly based in metropolitan areas (Tiwasing and Sawang, 2022). Policymakers in countries where membership in a chamber of commerce is voluntary should think about incentives to motivate SMEs to join a chamber of commerce (or similar networks), encouraging members to attend face-to-face or hybrid events dedicated to knowledge exchange about DT adoption and other timely issues. The establishment of more offices in rural areas or online networking events could also be considered. These initiatives would lower the obstacles for SMEs to participate in existing business networks because they enhance their accessibility.

Finally, we identify local differences between the SMEs in our sample: for instance, SMEs in England are more likely to engage with DT adoption than are SMEs in Scotland, Wales, or Northern Ireland. Rural

regions are superior here when compared to urban regions, supporting MacPherson and Holt's (2007) claim that a rural location does not impede SME innovation. Although the results are only marginally significant, they at least indicate that SMEs in deprived areas may lag behind, even in terms of non-disruptive DT adoption. These insights can further help ensure that support measures are designed and applied in a targeted manner in countries where regions differ in terms of economic development. For instance, by targeting SMEs in deprived areas, governments could implement dedicated funding schemes for digitalization projects suggested by businesses with substantial growth potential and discernible economic benefits for the region. Governments could also support business networks and local chambers of commerce in establishing peer mentoring schemes that could help SMEs learn from other businesses' experiences with DT adoption. These targeted support measures could mitigate the challenges that SMEs based in economically lagging regions face and contribute to the creation of a level playing field for businesses in the same country.

6.3. Limitations and future research

As with any study, our research entails limitations that do, however, provide promising avenues for future research. The methodological limitations of our study result from our use of cross-sectional secondary data. Whilst we do not aim to establish causal relationships (Bascle, 2008), further research using longitudinal data could refine our empirical insights. By using more recent data (our data set is from 2014), future empirical work may be able to fully reflect the rapid development of digital technologies. Primary data collection would allow for the measurement of the theoretical concepts through alternative variable definitions (going beyond the partial use of single-item measures) and for testing the robustness of our hypotheses in other contexts (Autio et al., 2014; Soluk et al., 2021a). The application of our research question to other geographic contexts is particularly promising, as the institutional setting in the UK (e.g., in terms of chambers of commerce and their memberships) cannot be easily transferred to other regions. Future case-based research could help to explain the heterogeneity within the group of SMEs (Kammerlander and De Massis, 2020), with regard to, for example, ownership structures (Decker and Günther, 2017; O'Regan and Ghobadian, 2002), time-varying effects across generations of family ownership (de Groot et al., 2022; De Massis and Kotlar, 2014; Soluk, 2022), or location effects (Giotopoulos et al., 2017; Lee et al., 2019). These dimensions could be used for either comparative case studies or the collection of primary quantitative data, which would allow for a tailored measurement of the concepts in our framework.

CRedit authorship contribution statement

Jonas Soluk: Conceptualization, Investigation, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. **Carolin Decker-Lange:** Conceptualization, Data curation, Formal analysis, Methodology, Software, Writing – original draft, Writing – review & editing. **Andreas Hack:** Writing – original draft, Writing – review & editing.

Data availability

Data will be made available on request.

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