



Digital strategy implementation: The role of individual entrepreneurial orientation and relational capital

Paavo Ritala^{a,*}, Abayomi Baiyere^{b,c}, Mathew Hughes^d, Sascha Kraus^e

^a LUT University, School of Business and Management, Finland

^b Copenhagen Business School, Department of Digitalization, Denmark

^c University of Turku, Information Systems Science, Finland

^d Loughborough University, School of Business and Economics, Loughborough LE11 3TU, United Kingdom

^e Free University of Bozen-Bolzano, Faculty of Economics & Management, Piazza Università 1, 39100 Bolzano, Italy

ARTICLE INFO

Keywords:

Digital strategy
Individual entrepreneurial orientation
Proactiveness
Risk-taking
Innovativeness
Relational capital
Performance

ABSTRACT

In transformational strategy contexts such as digitalization, the entrepreneurial behavior of the firm's employees is crucial. This study examines the role of employees' individual-level entrepreneurial orientation (IEO) in terms of proactiveness, risk-taking, and innovativeness, and their relational capital within the organization, on their performance in achieving organizations' digital strategy goals. We hypothesize that all IEO dimensions are positively associated with employees' digital strategy performance and that relational capital positively moderates the effect of proactiveness and risk-taking but negatively moderates the effect of innovativeness. The results of an intra-organizational survey of 166 employees at a medium-sized Northern European manufacturing firm provide partial support for our hypotheses. As part of the empirical design, we introduce a four-dimensional scale for organizational and individual digital strategy performance (Digital – Management, Infrastructure, Networking, and development – MIND). With this scale, we contrast the informants' self-assessment of their individual performance against their assessment of the overall organizational performance. Our study is one of the first to investigate IEO in a digital strategy context and provides implications for harnessing employees' entrepreneurial and innovative potential in digital transformation.

1. Introduction

Organizations consistently deal with new technologies and harness those when setting their strategic goals. The most significant socio-technical transformation affecting businesses of all types is undoubtedly *digitalization* – the leveraging of digital technologies (Ghosh et al., 2020; Setia et al., 2013), which places new demands and provides new opportunities for organizations and their employees (Bharadwaj et al., 2013; Wessel et al., 2021). Accordingly, organizations increasingly incorporate digital aspects in their strategy and strategizing (Bharadwaj et al., 2013; Mithas et al., 2013; Volberda et al., 2021). The COVID-19 crisis has significantly accelerated this development and has brought into light the inherent challenges of digitalization (see e.g., Kraus et al., 2020; Faraj et al., 2021; Klein and Todesco, 2021). For example, a digital strategy such as pivoting from being a manufacturing company to a software company entails business model transformation with digital offerings, which requires experimenting with organizational design

(Baiyere et al., 2020; Sund et al., 2016). As a broader socio-technical transformation (Tilson et al., 2010), this also requires firms to formulate digital strategies for creating digital value propositions (Bharadwaj et al., 2013; Krotov, 2017).

According to Bharadwaj et al. (2013), a *digital strategy* is an “organizational strategy formulated and executed by leveraging digital resources to create differential value” (p. 472). Because digitalization is pervasive and tightly woven into the organizational fabric, it is imperative to understand the factors that help or hinder digital strategy initiatives. While the technology itself is one important factor (Yoo et al., 2010), the success or failure of digitalization often depends on employee capabilities, skills, and mindset (Gilbert, 2006; Tripsas and Gavetti, 2000; Zimmer et al., 2020). Regrettably, we know little about what aspects of employees are critical to the achievement of digital strategy goals and the successful implementation of digital strategy. This remains perhaps the single greatest challenge in translating senior management motivation for digitalization into an organizational capability to do so

* Corresponding author.

E-mail addresses: ritala@lut.fi (P. Ritala), aba.digi@cbs.dk (A. Baiyere), m.hughes2@lboro.ac.uk (M. Hughes), sascha.kraus@zfk.de (S. Kraus).

<https://doi.org/10.1016/j.techfore.2021.120961>

Received 24 August 2020; Received in revised form 22 May 2021; Accepted 11 June 2021

Available online 25 June 2021

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(Ceipek et al., 2020).

In pursuing organizational goals related to digital strategy, the *entrepreneurial approach* adopted by firms and employees is considered fundamental (Nambisan, 2017; Zaheer et al., 2019; Elia et al., 2020). Indeed, digitalization itself has been characterized as an entrepreneurial process (e.g., Autio et al., 2018) because digital technologies are pervasive and transfunctional, extending to every organizational function, routine, and artifact (Yoo et al., 2010; Bharadwaj et al., 2013; Volberda et al., 2021), and requiring ongoing renewal (Warner & Wäger, 2019). We argue here that adopting, utilizing, and leveraging pervasive digital technologies depends substantially on employee entrepreneurial behaviors, especially in larger firms that are no longer organized solely around individual leaders but benefit from mobilizing the broader pool of entrepreneurial behaviors within their employee base (Barney et al., 2018; Foss and Klein, 2012; Henao-García et al., 2020; Hughes et al., 2018; Martín-Rojas et al., 2013; Zimmer et al., 2020).

A firm's entrepreneurial capacity is rooted primarily in the behavior of individual employees, whose innate orientation to innovative, proactive, and risky behaviors are likely to vary considerably (e.g., Bolton, 2012; Covin et al., 2020; De Jong, Parker, Wennekers, and Wu, 2015; Hughes et al., 2018; Kraus et al., 2019b; Langkamp-Bolton and Lane, 2012; Mom et al., 2007). Indeed, management literature provides extensive evidence of individual-level differences in employee skills and behavior, particularly in knowledge-intensive and creative contexts (see, e.g., Shalley et al., 2009; Von Nordenflycht, 2010; Ritala et al., 2020). Therefore, we contend that individual-level entrepreneurial behavior, a phenomenon that recent literature (e.g., Covin et al., 2020) has coined as *individual entrepreneurial orientation* (IEO), is an essential driver of the success of organizations' digital strategy and transformation.

Our study is the first to focus on employees' IEO in the context of a firm's digital strategy-related goals. Building on established literature, entrepreneurial behavior is a critical element in organizations' capacity to deal with the dual pressures of a rapidly changing external environment and a natural tendency toward inflexibility as the organization increases in size. Although recent research has investigated the process of digital strategy implementation (e.g., Marabelli and Galliers, 2017; Ross et al., 2017), little is known about how individual employees' orientations help or hinder digital strategy goals from being met. This is problematic because individuals' entrepreneurial behaviors and networks are likely to be especially important in transformative strategy contexts such as digitalization. Thus, focusing on individual agency and entrepreneurial behavior is warranted. However, entrepreneurial behavior does not take place in a vacuum. The ability to gather resources and advice from collegial networks (Edelman et al., 2004; Schweer et al., 2012) and tap into entrepreneurial opportunities (Lee and Venkataraman, 2006) depends on the individual's *relational capital* within the firm. This suggests a critical contingency role for the relational embeddedness of a firm's employees, which could both facilitate or hinder entrepreneurial behavior. The existing literature on digital strategy currently fails to illuminate these issues.

This study addresses these research gaps using a quantitative survey of 166 employees from a Northern European manufacturing system provider that has recently launched a digital strategy with four strategic priorities. We hypothesize that all three dimensions of an IEO (proactiveness, risk-taking, and innovativeness) are positively associated with employee contribution to meeting digital strategy goals. We further hypothesize that relational capital positively moderates the effect of proactiveness and risk-taking, but negatively moderates the effect of innovativeness. Our intra-organizational survey – which includes a co-created set of digital strategy-specific dependent variables – finds partial support for these hypotheses across four digital strategy performance categories. Our study augments corporate entrepreneurship and management research by showing how employee IEO and relational capital contribute to within-firm heterogeneity in employee

performance in the context of transformative strategic goals. By disaggregating the dimensions of IEO, we capture the differential effects of proactiveness, risk-taking, and innovativeness in enabling digital strategy.

2. Theory and hypotheses

2.1. Digitalization as a strategic context for strategy and entrepreneurial behavior

As a context for strategy and strategic goals, digitalization has particular features that demand an entrepreneurial approach at organizational and employee levels (Ghosh et al., 2020; Kraus et al., 2019; Le Dinh, Vu, and Ayayi, 2018; Sund et al., 2016). Indeed, many authors view digitalization as an entrepreneurial process (Autio et al., 2018; Nambisan, 2017; Wagner and Wäger, 2019). An entrepreneurial approach is needed for two reasons: organizational renewal demands entailed by new technologies and the need for an organizational culture that can accommodate novelty.

Digitalization is a socio-technical transformation (Tilson et al., 2010) where successful adoption and use of digital technologies depend on human and technical factors. When organizations adopt new technologies, individual abilities and attitudes are important determinants of use and subsequent success (Mirvis et al., 1991; Wu and Wu, 2005; Gilbert, 2006). High levels of individual-level heterogeneity are likely to influence the success of digitalization because it is inherently *transfunctional*, traversing organizational boundaries and extending beyond the IT section to the whole organization (Bharadwaj et al., 2013). In other words, digital technologies are *pervasive*, and digital capabilities are now incorporated into areas that were previously only physically material (Yoo et al., 2010). This means that individual embeddedness and networking abilities are crucial for digital strategy implementation and can only be fully understood through individual-level inquiry. Digitalization also increases speed in product launches, decision-making, supply chain orchestration, and network formation (Bharadwaj et al., 2013), rendering entrepreneurship among the employees especially salient.

Digital strategy can also be understood in classical accounts of organizational environments and cultures that empower employees to deal with novel challenges. Building on the Competing Values Framework (cf. Quinn and Rohrbaugh, 1983), one research stream contends that *adhocracy* (as opposed to clan, market, or hierarchical cultures) facilitates innovative and entrepreneurial behavior. Employees in such organizations achieve more innovative performance outcomes (Büschgens et al., 2013). Furthermore, this orientation makes it easier to adopt and apply new digital technologies (e.g. Theodosiou and Katsikea, 2012) as an ongoing process of strategic renewal that touches everyday life across the whole organization and is necessarily grounded in the prevailing culture (Warner and Wäger, 2019). Therefore, we expect an entrepreneurial approach among employees is instrumental when organizations aim to reach their digital strategy goals.

2.2. Individual-level entrepreneurial orientation

Entrepreneurial orientation (EO) is usually studied as *top managers'* or *owners'* disposition towards entrepreneurship (Covin and Slevin, 1989; Covin and Miller, 2014; Hughes and Morgan, 2007; Lumpkin and Dess, 1996), classically conceptualized by three sub-dimensions of *risk-taking*, *innovativeness*, and *proactiveness* (Wales et al., 2013, 2021). Consequently, entrepreneurial behavior has been mostly regarded as a firm-level phenomenon (Hughes et al., 2021). However, very recently, the literature on EO considers that “firm performance is a function of organizational- as well as individual-level behavior... [and] individual-level behavior on the part of the entrepreneur may affect an organization's actions, and in many cases, the two will be synonymous” (Covin and Wales, 2019, p. 8). From this follows that a firm's capacity for entrepreneurship is closely linked to the EO (and behaviors) of its

individual members (Covin et al., 2020; De Jong et al., 2015; Escribá-Carda et al., 2020; Hughes et al., 2018; Keil et al., 2017; Kraus et al., 2019b).

Based on this recent stream of research (e.g., Keil et al., 2017; Covin et al., 2020), we define IEO as an individual employee disposition that emphasizes his or her innovativeness, proactiveness, and risk-taking behaviors in the workplace. There is frequently a need for *innovation* competence at the employee level. For instance, among technical staff or those at the customer interface (Hayton and Kelley, 2006) and at the managerial level, including middle and top management (Heyden et al., 2018). Entrepreneurially oriented employees are also more likely to *proactively* channel their time and other resources into entrepreneurial opportunities for enacting change (Mustafa et al., 2018). Finally, entrepreneurially oriented employees are more likely to take *risks* such as challenging the status quo to influence corporate policy and resource allocation to support their entrepreneurial proclivity (De Jong et al., 2015).

However, entrepreneurial behavior is, of course, embedded in the organizational relational context. Indeed, organizational conditions can variously support, regulate, or constrain employees' entrepreneurial behavior (De Jong et al., 2015; Holcomb et al., 2009; Hughes et al., 2018; Mustafa et al., 2018), and any innovation-related behavior also requires a supportive climate (Anderson and West, 1998; Caldwell and O'Reilly, 2003). The access of individual employees to organizational resources and knowledge depends on the quality of their social interactions with colleagues – their *relational capital* (Mom et al., 2007). Aspects of relational capital are known to support individual innovative behavior (Hughes et al., 2018), informing learning (Berends and Lambers, 2010) through knowledge acquisition (Maurer et al., 2011) and knowledge creation (Nonaka et al., 1994), supporting exploration (Mom et al., 2007), and enabling access to resources (Adler and Kwon, 2002; Scott et al., 2021). However, relational capital can also create closeness (Hansen, 1999; Moran, 2005) and conformity (Edelman et al., 2004; Herrero and Hughes, 2019) that stifle innovation through stringent goal alignment. At excessive levels, conformity diminishes the willingness to invest time and effort in searching for new opportunities and knowledge beyond common goals (Mom et al., 2007).

2.3. Individual entrepreneurial orientation and organizational goals

We treat IEO dimensions independently because of their propensity to have independent effects (cf. e.g., in firm-level studies, Hughes and Morgan, 2007; Lomberg et al., 2017). We are interested in the relative impact of each dimension because to do otherwise would instill a potentially invalid assumption of equivalence that these dimensions are always equal and co-occur.

We propose that an employee with higher IEO will be more willing to adopt and contribute to the digital strategy goals of an organization. We expect IEO to facilitate intrapreneuring behavior (Mustafa et al., 2016, 2018) and a search process for new technologies to support products, services, and processes (Kraus et al., 2019b). Employees' innovative tendencies are associated with behaviors to create and enact changes in their work roles (Hughes et al., 2018). When mobilized effectively, such employees will seek to solve organizational challenges (Zampetakis and Moustakis, 2010) by innovating in the workplace to enhance workplace performance (Hughes et al., 2018) and form new initiatives to ward off competition (Croonen et al., 2016).

While these insights suggest the collective effects of IEO's dimensions, dimensional effects may differ. Individuals who are disposed to *proactive behavior* tend to affect change in their environment (Bateman and Crant, 1993) and take initiatives beyond the minimum requirement (Krueger, 1993). Similarly, *risk-oriented* corporate entrepreneurs tend to act despite the absence of structure or certainty (Elia and Margherita, 2018; Stewart et al., 1998), seeking out high-stakes activity full of risk. As both sets of behaviors favor action when faced with uncertainty, they are appropriate in the context of digitalization

(Weill and Woerner, 2018). However, high risk-taking favors the exchange of unusual knowledge and ideas (Jiang et al., 2019), delaying uncertainty reduction when pathways to achieving digital strategy goals are ambiguous. Indeed, digital strategy conditions are especially fraught with internal and external uncertainties and complexity (Hess et al., 2016; Loonam et al., 2018; Warner & Wäger, 2019). This is highlighted by the difficulty of predicting emergent means-ends relationships and optimal outcomes (Krotov, 2017) when established companies are forced to experiment with organizational designs and new business models (Amit and Zott, 2001; Sund et al., 2016; Warner & Wäger, 2019). Concurrently, individual *innovative behaviors* involving the intentional introduction or application of new ideas, processes, and procedures to one's role, work unit, or organization can enhance workplace performance (Hughes et al., 2018). This innovativeness orientation prompts new solutions to emerging challenges, makes new experiences meaningful, and shares that meaning with others in enacting a novel solution. These individuals also tend to act as champions (Howell et al., 2005; Markham and Griffin, 1998) in support of change. Collectively, they are better at anticipating and detecting opportunities for improvement and solutions to the challenges encountered when effecting change (e.g., De Jong & den Hartog, 2010; Hughes et al., 2018; Scott & Bruce, 1994). On that basis, we formulate the following hypotheses, one for each dimension of IEO:

Hypothesis 1a: *Individual-level proactiveness orientation is positively associated with individual performance in achieving an organization's digital strategy goals.*

Hypothesis 1b: *Individual-level risk-taking orientation is positively associated with individual performance in achieving an organization's digital strategy goals.*

Hypothesis 1c: *Individual-level innovativeness orientation is positively associated with individual performance in achieving an organization's digital strategy goals.*

2.4. Individual entrepreneurial orientation and digital strategy goals: the moderating role of relational capital

Organizational actors are embedded to a greater or lesser extent in a web of social networks, both inside and outside the organization. The benefits accruing from these networks constitute *relational capital*; as part of the broader concept of social capital, it refers to the nature and quality of the connections between individuals in an organization (Bolino et al., 2002; Edelman et al., 2004; Nahapiet and Ghoshal, 1998). Relational capital highlights *relational embeddedness*, focusing on the value of the actors' network rather than their network position (as in the structural embeddedness view). Through intra-firm networks, relational capital increases individuals' access to knowledge and other resources (Schweier et al., 2012). The closer and more trustworthy the relationships between organizational members become, the greater is their commitment to open and reciprocal knowledge sharing (Hansen, 1999; Moran, 2005; Camps and Marques, 2014). In the present context, we examine how relational capital affects entrepreneurial activity in pursuit of the organization's goals, a process that is strongly constrained or facilitated by other organizational actors and their resources (Kelley et al., 2009), and in other words, by their relational capital. Furthermore, relational capital can be considered as especially relevant for individual behavior in the context of digital strategy due to the pervasive (Yoo et al., 2010) and transfunctional (Bharadwaj et al., 2013) nature of digital technologies. Together, the relational embeddedness of entrepreneurial activity within an organizational context, and the pervasive and transfunctional nature of digital technologies, highlight the important role of relational capital in facilitating and constraining individual employee performance towards digital strategy goals.

First, we consider how intra-firm relational capital may benefit proactive and risky behavior in the context of digital strategy implementation. First, access to firm resources is essential for proactive and risky initiatives that initially lack legitimacy or allocated resources.

Individuals who can connect with their colleagues in different organizational positions are well placed to advance new entrepreneurial initiatives (Kelley et al., 2009). This increased access to resources also mitigates some of the potential risks of the unproven activity, leading to better performance and lower failure rates. Second, increased access to *inter-departmental* or *inter-functional* resources (especially knowledge) contributes to better performance regarding proactive and risky initiatives such as digitalization (see Hansen and Sia, 2015; Sia et al., 2016). In many cases, the requisite knowledge or resources do not reside within the given function but are found elsewhere in the organization. High levels of relational capital generate higher rates of knowledge exchange and more detailed feedback, and unproven ideas are shared and collectively improved (Hansen, 1999; Moran, 2005; Van Wijk, Jansen, and Lyles, 2008).

Relational capital is therefore likely to augment the role of proactive and risk-taking behaviors in achieving digital strategy goals precisely because of the high degree of flux and turbulence entailed by digitalization. Digital strategy implementation is fraught with challenges (Bharadwaj et al., 2013; Marabelli and Galliers, 2017; Ross et al., 2017; Sund et al., 2016). Overcoming these requires the garnering of cross-functional support and judicious learning combining disparate matrices of knowledge. In such circumstances, relational capital enables individuals to acquire new and enriching knowledge and expert insights (Mom et al., 2007), revealing new opportunities for completion of desired activities (Moran, 2005), solving problems in new ways (Sheremata, 2000), and improving exploration (Mom et al., 2015). On that basis, we formulated the following hypotheses.

Hypothesis 2a: *The effect of proactiveness orientation on individual employee performance in achieving an organization’s digital strategy goals is positively moderated by the employee’s relational capital.*

Hypothesis 2b: *The effect of risk-taking orientation on individual employee performance in achieving an organization’s digital strategy goals is*

positively moderated by the employee’s relational capital.

However, intra-firm relational capital is potentially less beneficial for innovatively oriented individuals, more often acting as a constraint for achieving organizational goals. While we would expect proactive and risk-taking individuals to benefit from resources made available through collegial networks, we believe that innovative employees may, on the other hand, be stifled in their performance when being embedded in dense networks. We expect a negative moderation effect based on two key arguments. First, individual-level creativity and innovativeness suffer from several well-known biases related to over-embeddedness in internal networks. The most prominent of these is *groupthink* – a tendency for densely connected teams to reduce the variety of ideas, explanations, and solutions (e.g., Nickerson et al., 2007). Second, individuals who possess valuable or novel knowledge are often asked for advice by their colleagues (Cross and Gray, 2013). While this benefits the organization as a whole and might enable more innovation in general (Camps and Marques, 2014), it may limit the performance of highly networked individuals, who may suffer ‘collaboration overload’ undermining individual-level outcomes (Polzer and DeFilippis, 2020). Over time, this may also lead to knowledge redundancy among individuals, restricting the effectiveness of innovation behavior in the presence of high relational capital. This, in turn, limits their ability to implement innovative and productive ideas, ultimately diminishing their contribution to organizational performance. The following hypothesis summarizes these arguments.

Hypothesis 2c: *The effect of innovative orientation on individual employee performance in achieving an organization’s digital strategy goals is negatively moderated by the employee’s relational capital.*

Overall, we propose a model of individual-level behavior where proactiveness, risk-taking, and innovativeness orientations increase employee performance in achieving an organization’s digital strategy goals. We also expect intra-firm relational capital to act as both enabling

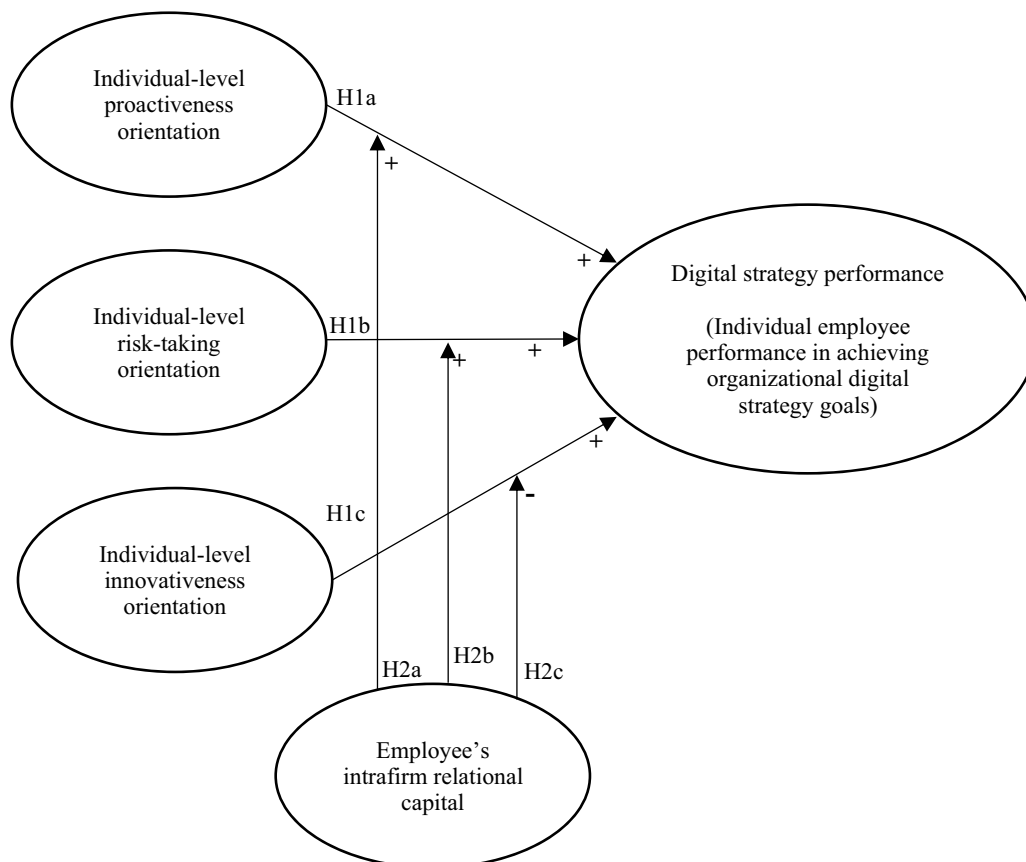


Fig. 1. Research model and hypotheses.

and restricting conditions for these behaviors. Fig. 1 provides a visual summary of the hypothesized relationships.

3. Empirical study

3.1. Context and data collection

The chosen empirical context was a manufacturing company in the early phase of digital strategy implementation, driven by the vision of moving from machinery sales to digital service provision leveraging manufacturing data, Internet of Things (IoT), and software solutions to offer new digital value propositions to manufacturers. The company is a medium-sized enterprise with operations across Europe, the Americas, and Asia. The need to engage in this strategic change was driven by two main trends – changing competitive landscape and technological advancements. The first trend is characterized by increasing competition from digital start-ups. These digital start-ups were increasingly leveraging digital technologies to propose similar value propositions to the case company's current and prospective clients. Second, besides the disruptive threat, another driver for the company's digital strategy is the opportunity to combine its current capabilities and the possibilities afforded by emerging digital technologies. For example, the company realized the potential business opportunities that they could unlock by adopting digital technologies such as IoT, 3D printing, and augmented reality as core components of their business models and value delivery. With this background of looming disruptive threats and the promise of digital innovations, the company made a strategic decision to implement a digital strategy, which is the core focus of this study.

With this background, the company took steps that include a) establishing a new digital business unit and b) outlining a portfolio of digital innovations to drive their transformation agenda. Unlike many other forms of organizational transformation, digitalization requires competencies and operational approaches that rely heavily on employee orientation at a pressing speed, scale, and scope (Bharadwaj et al., 2013). Thus, the chosen company provided a relevant context to capture this orientation in terms of proactiveness, risk-taking, and innovativeness at the individual-level and intra-organizational relational capital. Further, by confining the study to a single organization, we could operationalize IEO using indicators aligned with our hypotheses and chosen level of analysis.

The primary data were collected by surveying all company employees. We sent English-language questionnaires to the entire workforce ($N = 402$) across all units and international locations. In total, 166 responded to the survey, with 161 usable data points, yielding a 40% response rate. Several reasons informed our choice of research design. First, we considered it essential to survey the whole organization to avoid an upper/lower echelon logic. This is consistent with our concern to include all employees at managerial and operational levels. Secondly, our choice of a quantitative approach was informed by the need to capture *perceptions* of IEO that can provide relevant information in our IEO model, which is more useful than objective measures, such as resource allocations (Lyon et al., 2000). Finally, the approach was particularly appropriate in our context, as digital strategy commonly includes commercially sensitive content that companies are reluctant to disclose (Grover and Kohli, 2013).

Before designing the survey instrument, we embarked on a three-step process to develop the scale used in our study. First, we synthesized the digital capabilities literature into four dimensions – Management, Infrastructure, Networking, and Development – or MIND (based on the initial work by Baiyere and Salmela 2014, 2015; Baiyere, 2017; see also Matt et al., 2015; Peppard and Ward, 2004; Westerman et al., 2012; Uhl et al., 2016). These dimensions represent an overarching view to the digital capabilities required for digital strategy implementation.

Second, we conducted two strategy workshops with the case company to establish how their digital strategy aligned with the dimensions of digital capabilities elaborated in the previous literature. To that end,

we further co-developed the MIND framework in conjunction with the case company, refining the meaning and content ascribed to each dimension and enabling us to co-develop measurement scales. This process followed the recommendations of design science research (DSR) postulated in the Information Systems discipline (see (Hevner et al., 2004)Baskerville et al., 2018), which we draw upon to validate our scales. The core tenet of DSR is founded on the philosophical underpinning of pragmatism, which gives a basis for validating the MIND framework as it stipulates that a created artifact/framework is systematically evaluated to assess its fit and usefulness to the issue at hand (Gregor and Hevner, 2013; vom Brocke et al., 2020). We believe that such a co-creation approach improves both the face validity (Holden, 2010) and the content validity (Rossiter, 2008) of a new scale. Following this logic, our abstraction of MIND from the literature was not taken for granted but was evaluated through the workshops with practitioners and further reinforced by the framework's subsequent practical utility in the formulation of the organization's digital strategy. In essence, the DSR guidelines provided us a systematic approach for evaluating the appropriateness of the MIND framework in capturing the digital capabilities required for pursuing a digital strategy.

Third, by scaffolding the digital strategy and providing a common language for evaluating the organization's current status relative to its desired state, the MIND framework served as a sense-making device that helped to specify the digital capabilities required for executing digital strategy in our survey (Tumbas et al., 2017; Westerman et al., 2014). The survey design and individual item wording were based on a formulation of the organization's digital strategy through the lens of the MIND framework. In developing the survey items for dependent variables, the workshops and associated communication of the organization's strategy provided valuable inputs and ultimately helped to enhance the reliability of survey responses.

3.2. Measures

Dependent variables: In developing the measurement approach, we followed the mainstream strategy literature where the key phenomena relate to strategic goals and firms' resources and capabilities to pursue these goals (e.g., Grant, 2015). First, we see the digital strategy as the overarching context where the firm sets its goals related to the digital strategy implementation. To pursue these strategic goals, the firm needs capabilities to use its resources effectively (Teece et al., 1997). Our study focuses on the individual level; in the organizational context, the individuals collectively construct and implement the firm's capabilities (Spender, 1996). Therefore, in developing our dependent variables, we examined the *individual performance in achieving an organization's digital strategy goals*.

Given the lack of availability of objective performance measures (the respondents worked in different types of positions and different work contexts within the company), we developed a measure for employee self-assessment of individual performance in the organizations' digital strategy. Following recent studies of individual employee performance self-assessment, the informants were asked to assess their performance by comparison with their colleagues (see, e.g., Henttonen et al., 2016), but we took further steps to reduce the potential biases associated with self-reporting. Specifically, we asked informants first to assess their organization's ability to reach the specific digital strategy goals. We then asked how they would assess their performance in reaching those goals. By subtracting the former from the latter, we created a set of variables revealing the 'performance gap' between individual contribution and organizational ability. The fact that the individuals *did not* score their abilities systematically higher than those of the organization supports this approach to minimize some self-perception biases (see mean values for the four dependent variables in Table 2).

Naturally, this performance gap is perceptual; nevertheless, we expect this measure to capture sufficiently well the relative differences between individuals in terms of their contribution to the variety of

digital strategy goals within the organizational context for two reasons: first, we rely on previous evidence demonstrating that objective and subjective performance assessments tend to correlate (Sarkar et al., 2001). Second, we expect the individuals themselves to be knowledgeable of their own performance on specific tasks. Due to confidentiality reasons and the lack of available data, we did not have access to third-party assessment (e.g., supervisory assessment). The individuals' assessment was subsequently considered the best option (see, e.g., Hughes et al., 2018).

The dependent variables incorporated the four MIND dimensions of performance concerning digital strategy (management, infrastructure, networking, and development). For each of these dimensions, two questions assessed organizational and individual performance (see Appendix for details). The four dimensions, which we developed via the previously discussed DSR procedure, relating to the IT and digital capabilities needed to drive an organization's strategy. *Management capability* (M) refers to the ability to plan and orchestrate digital resources when making strategic decisions and choices that align with the organization's overall goals and vision (Bharadwaj et al., 2013; Wade and Hulland, 2004). *Infrastructure capability* (I) defines the human and technological digital assets that determine the extent to which the organization can exploit the benefits of its IT investments, reflecting its tangible and intangible digital resources (Fürstenau et al., 2019; Neumann and Fink, 2007; Uhl et al., 2016). *Networking/Sourcing capability* (N) is the organization's ability to harness digital assets that reside beyond its organizational borders as determined by its speed and effectiveness in accessing, utilizing, and exploiting external digital resources (Sambamurthy et al., 2003; Selander et al., 2013). *Development capability* (D) is the extent to which an organization can deploy its digital resources to meet its current or emerging business, operational, and service needs (Cragg et al., 2011; Ravichandran et al., 2005). It is important to note that while we view conceptualize these four categories as capabilities, our items measure individual performance, which underlies the ability of individuals to take part in the collective implementation of organizational capabilities (Spender, 1996).

We assessed the discriminant validity of the dependent variables in three series of exploratory factor analysis (principal components with varimax rotation): 1) organization-level measures, 2) individual-level measures, and 3) measures subtracting individual from organizational items. Each analysis provided a four-dimensional solution, in which the strongest factor loadings were associated with the expected dimension in the MIND framework. Cronbach's alpha values supported the internal reliability of the final measures, calculated as the mean of 'performance gaps' for the two items in each dimension (Management capability: 0.88; Infrastructure capability: 0.80; Networking capability 0.84; and Development capability: 0.87). We would expect this approach to dependent variables to work well within our local research design scope in light of its close alignment with the company's actual performance goals.

Individual entrepreneurial orientation was measured by items developed for this purpose by Fellnhöfer et al. (2017), adapted from Bolton (2012) and Langkamp-Bolton and Lane (2012), who were the first to translate Covin and Slevin's (1989) firm-level EO scale to the individual level. We measured all three standard dimensions of EO (proactiveness, risk-taking, and innovativeness) at the individual level. In assessing the discriminant and construct validity of these measures, it became clear that our data did not load onto the initial threefold theoretical scheme. The items loaded very strongly to two dimensions in the factor analysis using principal components with Varimax rotation and no pre-fixed number of factors assigned. On the other hand, extracting a fixed number of three factors did not produce a three-tier model aligned with the conceptual scheme but rather divided the innovativeness part of the scale into more distinct factors. Therefore, the most fitting factor solution both conceptually and empirically was considered a two-dimensional model with 1) proactiveness and risk-taking orientation and 2) innovativeness orientation. The first dimension included all

six items related to proactiveness and risk-taking (3 + 3 items), and the second included six items related to innovativeness. After this initial factor analysis, we deleted three items from the innovativeness scale in light of high cross-loading among two items and weak factor loading in one. The final measures confirm discriminant validity and sufficient internal reliability (Cronbach's alpha: 0.88 for proactiveness and risk-taking, and 0.80 for innovativeness), as well as sufficiently strong factor loadings for each remaining item. The detailed wording of the items and results of the final factor analysis are reported in Table 1.

Internal relational capital was measured on an existing scale reported in Inkinen et al. (2017). This scale includes three items related to the individual's understanding of their colleagues in different parts of the firm, frequency of internal collaboration, and the quality of internal collaboration (see Appendix for full item wording). We used internal relational capital as a moderator variable to test Hypotheses 2a-2c. As relational capital also has an external dimension, we also measured *external relational capital* using a scale reported in Inkinen et al. (2017). The content is similar to the internal relational capital scale but focuses on external stakeholders (e.g., customers, suppliers, partners). External relational capital was used to control for the potential effects of external connectivity (as it has been shown to affect innovation and entrepreneurial outcomes in firms; Antoncic and Prodan, 2008; Ritala et al., 2015), as well as in post hoc analyses for its potential moderating role.

Table 1
Principal components factor analysis: Dimensions of IEO.

Underlying theoretical construct and item wording	Dimension 1: Proactiveness and Risk-taking orientation	Dimension 2: Innovativeness orientation
Proactiveness 1: I usually act in anticipation of future problems, needs or changes and initiate actions to which others respond.	0.730	
Proactiveness 2: I excel at identifying opportunities and tend to plan ahead on projects.	0.793	
Proactiveness 3: I prefer to "step-up" and get things going on projects always trying to take the initiative in every situation rather than sit and wait for someone else to do it.	0.852	
Risk-taking 1: I like to take bold action by venturing into the unknown encouraged to take calculated risks with new ideas.	0.769	
Risk-taking 2: I am willing to invest a lot of time and/or money on something that might yield a high return taking bold, wide-ranging actions to achieve my objectives.	0.726	
Risk-taking 3: When confronted with decisions involving uncertainty, I tend to act "boldly" in situations where risk is involved.	0.705	
Innovativeness 1: In general, I prefer a strong emphasis in projects on unique, one-of-a-kind approaches rather than revisiting tried and true approaches used before.		0.719
Innovativeness 2: I prefer to try my own unique way when learning new things rather than doing it like everyone else does.		0.858
Innovativeness 3: I favor experimentation and original approaches to problem solving rather than using methods others generally use for solving their problems.		0.888

The two measures of relational capital loaded strongly to two different factors in the analysis, and the reliability indicators were sufficiently strong (Cronbach’s alpha: 0.74 for internal relational capital and 0.82 for external relational capital).

Other control variables included relevant demographic items and other individual-level measures that might affect the results. First, we controlled for age, university education (a binary variable), managerial position (a binary variable), organizational experience (number of years), and overall industry experience (number of years). Controlling for these demographic features is important because prior experience and the level of education improves the job performance (Schidt, Hunter, and Outerbridge, 1986; Dokko et al., 2009; Ng and Feldman, 2009), and employee age and managerial position can affect performance (Turnipseed and Rassuli, 2005; Ng and Feldman, 2008). We also controlled for the respondent’s organizational unit using dummy variables; as a benchmark dummy, the largest (regional) unit was not included in the analysis. Finally, we measured self-efficacy (i.e., self-assessment of the respondent’s abilities) using a scale developed by Chen et al. (2001). It was important to control for self-efficacy because our focus variables relate to individual entrepreneurial orientation. Thus, we controlled for general beliefs about one’s ability since it might affect specific beliefs about particular orientations. Cronbach’s alpha for this 8-item measure was 0.93.

Common method variance is a potential problem to the research design, given that the data for different variables were collected from single informants. To assess the existence of such bias, we utilized Harman’s one-factor test (Podsakoff et al., 2003), where all self-reported continuous variables were inserted into an explorative factor analysis. The examination of an unrotated factor solution revealed that the largest factor accounted for 28% of the variance. Based on this, we conclude that common variance does not represent a significant bias in our research design.

4. Results

Table 2 reports descriptive statistics and correlations for the variables used in this study. From the table, it is worth noting the relatively modest correlation between the two dimensions of IEO (0.36), indicating the construct’s two-dimensionality. Another notable point is that proactiveness and risk-taking are generally positively associated with performance, while innovativeness orientation is not. Additionally, self-efficacy, age, and industry experience correlate quite highly with proactiveness and risk-taking orientation but much less with innovativeness. This suggests that proactive and risk-taking orientation is associated with high regard for one’s abilities and industry experience and age. In contrast, innovativeness orientation is more common among less experienced and younger individuals. Finally, holding a senior managerial position seems to correlate positively with both dimensions of IEO.

We used a series of multivariate hierarchical regression analyses to test the hypotheses, given their suitability with our research approach and data. We chose to run four separate sets of regressions, corresponding to the four types of individual-level performance in digital strategy implementation. Running separate series of tests for each dependent variable is grounded on the previously reported discriminant validity tests related to the MIND framework (each dimension loads to a different factor and each has feasible internal reliability). In pragmatic terms, the number of explanatory variables (15) in each model does not allow us to test aggregate structural models with all four DVs included with our dataset ($n = 166$).

Tables 3-6 report the results of regression models. Each table reports three models: first with control variables only, second with focus variables added, and third with the interaction effects. Fig. 2 plots all significant ($p < 0.05$) interaction effects to facilitate interpreting the moderating hypotheses testing. For each figure, interaction effects are visualized with low and high values (one standard deviation lower or

Table 2
Descriptive statistics and correlations.

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Digital management performance	0.16	1.54													
2. Digital infrastructure performance	-0.27	1.56	0.65**												
3. Digital networking performance	-0.29	1.52	0.69**	0.68**											
4. Digital development performance	0.06	1.64	0.67**	0.71**	0.68**										
5. Proactiveness & risk-taking orientation	5.22	0.92	0.19*	0.13	0.16*	0.24**									
6. Innovativeness orientation	4.58	1.09	-0.06	0.07	0.06	0.12	0.36**								
7. Internal relational capital	5.37	1.07	0.07	0.05	-0.03	0.05	0.44**	0.15							
8. External relational capital	5.15	1.22	0.15	0.15*	0.16*	0.23**	0.45**	0.07	0.45**						
9. Self-efficacy	5.75	0.82	0.12	0.10	0.05	0.15	0.64**	0.20**	0.57**	0.47**					
10. Age	2.02	0.68	-0.12	-0.12	-0.16*	-0.20*	0.18**	0.00	0.08	0.23**	0.09				
11. University education	0.46	0.50	0.16*	0.14	0.14	0.16*	0.05	0.07	0.08	0.00	0.04	0.01			
12. Managerial position	0.34	0.47	0.03	0.07	-0.01	0.07	0.26**	0.16*	0.21**	0.30**	0.18*	0.30**	0.13		
13. Organizational experience (years)	8.24	8.76	-0.12	-0.09	-0.14	-0.23**	0.04	-0.06	0.12	0.04	0.04	0.54**	-0.02	0.17*	
14. Industry experience (years)	16.68	11.02	-0.12	-0.14	-0.17*	-0.23**	0.22**	-0.03	0.07	0.28**	0.10	0.83**	-0.06	0.32**	0.58**

S.D. = Standard deviation.

* $p < 0.05$.

** $p < 0.01$.

Table 3
Regression results: Digital Management Performance (standard errors in parentheses).

	<i>Model 1:</i>		<i>Model 2:</i>		<i>Model 3:</i>	
Control variables						
Age	-0.02	(0.30)	0.00	(0.30)	-0.01	(0.30)
University education	0.08	(0.24)	0.08	(0.24)	0.10	(0.24)
Managerial position	-0.01	(0.27)	-0.00	(0.27)	0.02	(0.27)
Organizational experience (yrs)	0.01	(0.02)	0.02	(0.02)	0.01	(0.02)
Industry experience (yrs)	-0.21	(0.02)	-0.27 [†]	(0.02)	-0.24 [†]	(0.02)
Digital unit	0.36**	(0.36)	0.37**	(0.35)	0.35**	(0.35)
Life cycle unit	0.19*	(0.38)	0.15	(0.37)	0.17 [†]	(0.38)
Sales & marketing unit	0.35**	(0.45)	0.31**	(0.44)	0.31**	(0.44)
Specialized unit	0.13	(0.37)	0.15	(0.36)	0.11	(0.36)
Other units	0.16 [†]	(0.45)	0.16 [†]	(0.44)	0.15 [†]	(0.43)
Self-efficacy	0.05	(0.18)	-0.04	(0.20)	0.02	(0.20)
External relational capital	0.11	(0.15)	0.07	(0.15)	0.06	(0.12)
Internal relational capital	0.00	(0.15)	-0.02	(0.15)	-0.02	(0.15)
Focus variables						
Proactiveness & risk-taking orientation			0.27*	(0.17)	0.27*	(0.17)
Innovativeness orientation			-0.19*	(0.13)	-0.18*	(0.13)
Interaction effects						
Proactiveness & risk-taking orientation × Internal relational capital					0.10	(0.09)
Innovativeness orientation × Internal relational capital					-0.20**	(0.11)
F	3.01**		3.28**		3.44**	
F change			4.17*		3.76*	
R ²	0.21		0.25		0.29	

[†] $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$ (two-tailed).

higher from the variable mean) for both the explanatory variable (proactiveness & risk-taking or innovation orientation) and the moderating variable (internal relational capital). For each of the analyses, multicollinearity was assessed by examination of tolerance and variance inflation factors. The test statistics for all independent variables were well among acceptable levels, suggesting that multicollinearity does not pose a challenge for interpreting the results.

Starting with direct effects, Hypotheses 1a and 1b (regarding the positive effect of proactiveness and risk-taking orientation on individual digital strategy performance) find broad support. These orientations demonstrate positive and significant coefficients for all dependent variables, except for digital infrastructure performance, which shows a non-significant (though positive) result. On the other hand, the hypothesized positive effect of innovativeness orientation (H1c) is not supported in any model. Instead, it is negatively and significantly associated in Table 3 with digital management performance, while with the other dependent variables, the effect of innovativeness orientation is very close to zero.

Hypotheses 2a and 2b (regarding the positive moderating role of internal relational capital on the effect of proactiveness and risk-taking orientation on individual digital strategy performance) are only partly supported. A positive interaction effect is found only in the case of digital infrastructure performance (Table 4).

Hypothesis 2c (regarding the negative moderating role of internal relational capital on the effect of innovativeness orientation on

individual performance) finds broad support. As hypothesized, all four of the interaction effects are negative and significant at the $p < 0.05$ level (digital management, infrastructure, and networking performance; Tables 3-5) and at the $p < 0.10$ level for digital development performance (Table 6).

As well as testing the hypotheses referred to above, we performed an additional posthoc analysis of interaction effects for external relational capital, using model specifications similar to those in Tables 3-6 but using external relational capital as a moderator. It is reasonable to assume that external relational capital may help individuals access external resources, improving their performance or innovativeness (see, e.g., Laursen and Salter, 2006). The absence of significant results in either a positive or negative direction indicates that internal relational capital indeed plays a role (both as a positive and negative contingency, as shown in the results). However, the effects of IEO on performance are indifferent to the level of external relational capital.

5. Discussion and implications

This study examined the effect of different dimensions of IEO (proactiveness, risk-taking, and innovativeness) on employee performance concerning the organization’s digital strategy goals. We also examined how intra-organizational relational capital moderates this relationship, anticipating a positive interaction role for proactiveness and risk-taking orientation and a negative role in innovation orientation.

Our findings partially support our hypotheses. In particular, we found that individual proactiveness and risk-taking orientations (which load empirically as one construct) positively affected employee performance for three of the four digital strategy goals. However, individual innovation orientation did not positively affect employee performance for any of the digital strategy goals, but instead negatively affected employees’ digital management performance.

We also found that relational capital both facilitates and constrains employee digital strategy performance. On the one hand, concerning employees who exhibit a proactive and risk-taking orientation, relational capital helps digital infrastructure performance (which was the only dependent variable with no direct positive effect for this orientation). On the other hand, the results show a consistently negative moderating effect of relational capital for all four digital strategy performance categories concerning innovativeness orientation. This consistent negative interaction effect – coupled with no positive direct effects in any category – suggests that innovatively oriented individuals struggle to set strict digital strategy goals. Their performance drops even further in dense relational networks. These results can be interpreted in the light of the individual experimentation and uniqueness-seeking of innovative individuals.

5.1. Research contributions

Our findings contribute to the emerging discussion in the management literature where digitalization – and related digital strategy implementation – is seen as a socio-technical and pervasive process (Baiyere et al., 2020; Wagner and Wäger, 2019; Zaheer et al., 2019). Perhaps the single greatest challenge in translating senior management motivation for digital strategy is the absence of knowledge on what aspects of employees and their behavior are critical to achieving digital strategy goals (e.g., Ceipek et al., 2020). Indeed, to date, the human element in achieving digital strategy goals has remained an enigma. We identified the pervasiveness (Yoo et al., 2010) and transfunctionality (Bharadwaj et al., 2013) of digital technologies as features that highlight the role of the individual in digital strategy implementation. These features also explain why successful implementation of digital strategy requires collaboration across the organization (Hansen & Sia, 2016; Sia et al., 2016) to synthesize the requisite relational capital. In this regard, we found modest empirical support for the merits of intra-firm relational capital, which positively moderated the effects of individual proactive

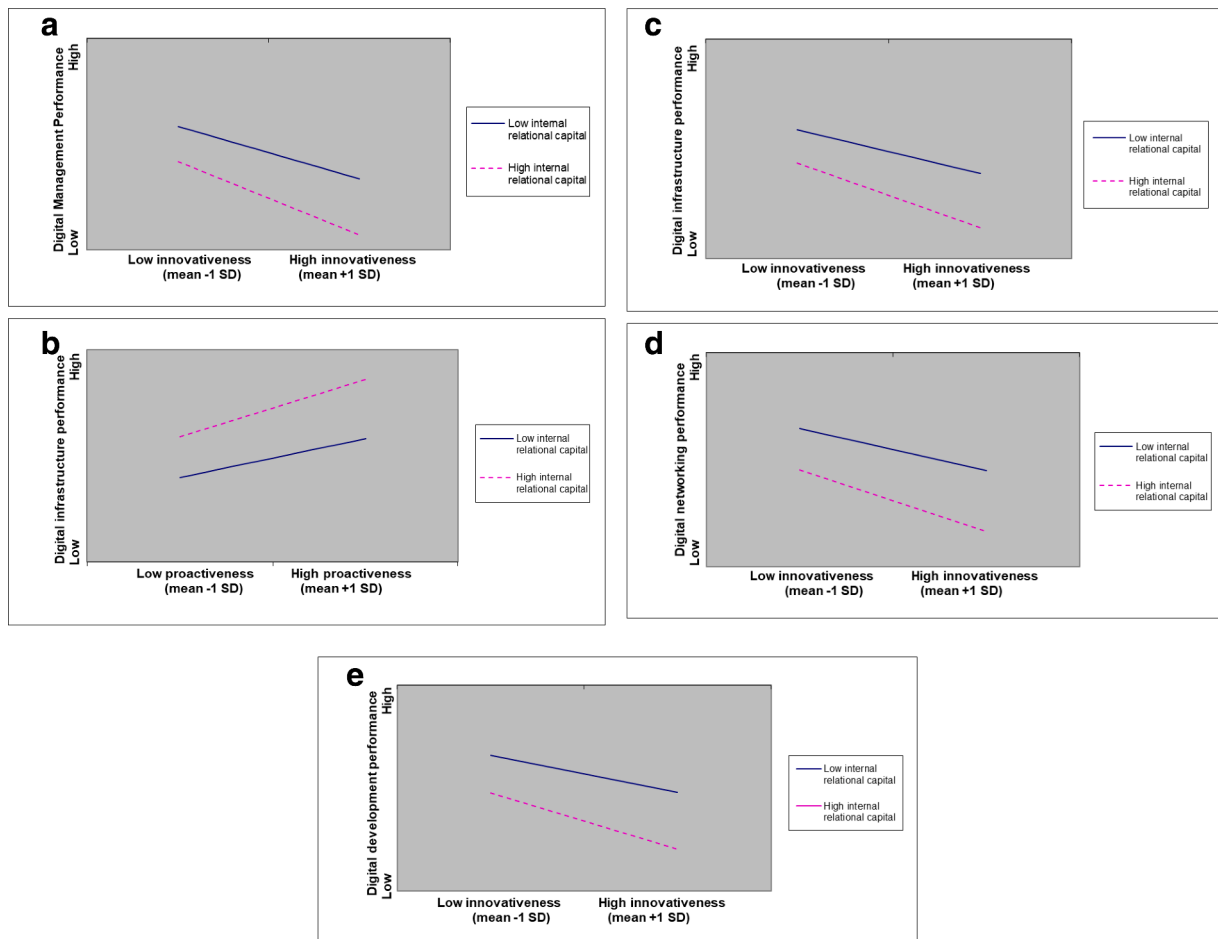


Fig. 2. Interaction plots for all significant (* $p < 0.05$) interaction effects.

and risk-taking orientations on performance in one of the four digital strategy categories. The results also indicate that, for more innovative individuals, relational networking may impose a ‘performance strain’ on digital strategy goals. To put it more accurately, the negative moderating effect of relational capital on innovativeness suggests that when innovative individuals share their ideas in a dense relational network, their performance suffers. These mixed results regarding the role of relational capital are aligned with the suggestion of Edelman et al. (2004) in that relational capital has both benefits and downsides. Our results provide a nuanced view on which types of employee entrepreneurial behavior mainly benefits from internal relational capital, shedding more light to the potential benefits and downsides in the context of digital strategy implementation. These findings also allow us to demonstrate the intra-organizational context sensitivity of IEO. At the individual level, we show that the contribution of IEO to achieving digital strategy goals is not evenly distributed across the IEO dimensions (proactiveness and risk-taking orientation is mainly beneficial, while innovativeness orientation less so). This extends the emerging conceptualization and nomological network of IEO, following recent contributions by Covin et al. (2020), De Jong et al. (2015), Keil et al. (2017), and Kraus et al. (2019b). We also extend on the observations of Hughes et al. (2018). They identified trust in supervisor and trust in team members as influences on individual innovative behavior by showing that the larger concept of relational capital change the effects of individuals’ proactive, risk-taking, and innovativeness orientations. Concurrently, our findings show that the assumption in the emerging digitalization literature on the necessity for individual entrepreneurship behavior (e.g., Autio et al., 2018; Kraus et al., 2019a; Le Dinh et al., 2018; Nambisan, 2017; Sund et al., 2016) is both correct, but also to

some extent limited when contingencies are overlooked.

Second, we found support for the view that digital strategy benefits from an entrepreneurial approach and facilitates entrepreneurial behavior. It has been suggested that digitalization is itself an entrepreneurial process (Nambisan, 2017; Autio et al., 2018; Wagner and Wäger, 2019). For example, a recent study involving 102 bank CEOs showed that strategic vision alone does not ensure increased success unless EO comes into play as a moderator (Niemand et al., 2020). As digitalization creates uncertainty and complexity in the firm’s external business environment and its internal processes (e.g., Matt et al., 2015; Loonam et al., 2018; Baiyere et al., 2020; Wessel et al., 2021), our finding that employee proactiveness and risk-taking support digital strategy-related performance highlights the merits of an entrepreneurial approach. However, we found no corresponding support for innovativeness orientation. Concurrently then, these findings further show the inaccuracy of the assumption in the emerging digitalization literature on the necessity for individual entrepreneurship behavior (e.g., Autio et al., 2018; Kraus et al., 2019a; Le Dinh et al., 2018; Nambisan, 2017; Sund et al., 2016) when not disaggregating the phenomenon into types of behaviors that underpin an IEO.

Third, our study is one of only very few so far (e.g., Covin et al., 2020; Hughes et al., 2018; Kattenbach and Fietze, 2018; Kraus et al., 2019b; Langkamp-Bolton and Lane, 2012) to investigate EO at an individual level, and – to our knowledge – the first to do so in the context of digitalization. In so doing, we contribute to the emerging stream of IEO (e.g., Covin et al., 2020) and the general EO literature by introducing a new context to the ongoing discussion. Our results also refine the mainstream position that EO is primarily a firm-level construct, even if we do not dispute this position or seek to reduce it only to the individual

Table 4
Regression results: Digital Infrastructure Performance (standard errors in parentheses).

	<i>Model 1:</i>		<i>Model 2:</i>		<i>Model 3:</i>	
Control variables						
Age	0.01	(0.31)	0.02	(0.31)	-0.02	(0.31)
University education	0.12	(0.25)	0.12	(0.25)	0.14 [†]	(0.25)
Managerial position	0.04	(0.28)	0.04	(0.29)	0.05	(0.28)
Organizational experience (yrs)	0.05	(0.02)	0.06	(0.02)	0.07	(0.02)
Industry experience (yrs)	-0.23	(0.02)	-0.25	(0.02)	-0.24	(0.02)
Digital unit	0.34**	(0.37)	0.34**	(0.37)	0.32**	(0.36)
Life cycle unit	0.27**	(0.39)	0.25*	(0.39)	0.25*	(0.39)
Sales & marketing unit	0.18 [†]	(0.46)	0.16 [†]	(0.46)	0.16 [†]	(0.46)
Specialized unit	0.24*	(0.38)	0.25*	(0.38)	0.21*	(0.38)
Other units	0.20*	(0.46)	0.20*	(0.46)	0.18*	(0.45)
Self-efficacy	0.02	(0.18)	-0.03	(0.21)	0.05	(0.21)
External relational capital	0.13	(0.15)	0.12	(0.15)	0.12	(0.12)
Internal relational capital	0.00	(0.16)	-0.02	(0.16)	0.00	(0.15)
Focus variables						
Proactiveness & risk-taking orientation			0.12	(0.17)	0.15	(0.17)
Innovativeness orientation			-0.01	(0.13)	-0.03	(0.13)
Interaction effects						
Proactiveness & risk-taking orientation × Internal relational capital					0.20*	(0.09)
Innovativeness orientation × Internal relational capital					-0.19**	(0.12)
F	2.58**		2.31**		2.68**	
F change			0.66		4.56**	
R ²	0.18		0.19		0.24	

[†] $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$ (two-tailed).

level. Taking the challenge of digitalization as a specific pinch point in strategic entrepreneurship, we inferred a need to examine individual entrepreneurial behavior to enhance our knowledge of corporate entrepreneurship and EO. Specifically, EO's distinguishing feature is that, as an organizational attribute, it involves a *sustained pattern* of entrepreneurial behavior (Covin and Wales, 2019). Ultimately, however, behavior is individual; assuming that individuals are neither homogenous nor mindless robots, it is crucial to explore their potential to exhibit sustained entrepreneurial behavior through the IEO lenses. In so doing, we can hope to resolve the longstanding puzzle of why individual entrepreneurial behavior varies within the organization (Keil et al., 2017; Wales et al., 2011) and what role it bears in a digitalization context. Acknowledging that a firm's capacity for entrepreneurship is rooted mainly in the entrepreneurial behavior of individual members (e.g., Brøndum, 2019), who vary widely in their orientation to innovative, proactive, and risky behaviors (e.g., Bolton, 2012; De Jong et al., 2015; Hughes et al., 2018; Mom et al., 2015), our findings invite deeper investigation of the microfoundations of EO on an individual, person-related level to further shape theory and knowledge.

Our final contribution is the build-up of the scale measuring digital strategy performance in four dimensions – Management, Infrastructure, Networking and Development – or MIND (framework initially based on Baiyere and Salmela, 2014, 2015; Baiyere 2017). Using a design science approach to co-create this scale using prior literature and sense-making with the company practitioners, we believe our scale has better face

Table 5
Regression results: Digital Networking Performance (standard errors in parentheses).

	<i>Model 1:</i>		<i>Model 2:</i>		<i>Model 3:</i>	
Control variables						
Age	-0.04	(0.31)	-0.03	(0.30)	-0.03	(0.30)
University education	0.11	(0.25)	0.11	(0.24)	0.12	(0.24)
Managerial position	-0.02	(0.28)	-0.04	(0.28)	-0.02	(0.28)
Organizational experience (yrs)	0.04	(0.02)	0.06	(0.02)	0.04	(0.02)
Industry experience (yrs)	-0.24	(0.02)	-0.29 [†]	(0.02)	-0.26 [†]	(0.02)
Digital unit	0.21*	(0.36)	0.20*	(0.36)	0.20*	(0.36)
Life cycle unit	0.10	(0.38)	0.06	(0.38)	0.09	(0.39)
Sales & marketing unit	0.16	(0.45)	0.13	(0.45)	0.13	(0.45)
Specialized unit	0.07	(0.38)	0.09	(0.37)	0.06	(0.37)
Other units	0.12	(0.45)	0.12	(0.45)	0.11	(0.45)
Self-efficacy	0.02	(0.18)	-0.11	(0.20)	-0.07	(0.21)
External relational capital	0.26*	(0.15)	0.23*	(0.15)	0.22*	(0.12)
Internal relational capital	-0.15	(0.15)	-0.18 [†]	(0.15)	-0.18 [†]	(0.15)
Focus variables						
Proactiveness & risk-taking orientation			0.28*	(0.17)	0.27*	(0.17)
Innovativeness orientation			-0.05	(0.13)	-0.03	(0.13)
Interaction effects						
Proactiveness & risk-taking orientation × Internal relational capital					0.05	(0.09)
Innovativeness orientation × Internal relational capital					-0.19*	(0.12)
F	2.10*		2.31**		2.43**	
F change			3.25*		2.89 [†]	
R ²	0.15		0.19		0.22	

[†] $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$ (two-tailed).

validity (Holden, 2010) and content validity (Rossiter, 2008) than those scales developed in isolation from the empirical context. As our scale helps to measure both organizational digital strategy performance and individual employees' contribution towards digital strategy goals under four dimensions, we hope that this scale can help other researchers to assess organizations' and individuals' digital strategy performance. While our scale is based on a self-assessment of performance across the organization and individual levels, future studies could also develop more advanced ways to measure digital strategy performance (e.g., with separate respondents to different levels).

5.2. Managerial implications

Given the increasing need for organizations to formulate and implement a digital strategy to remain relevant, our findings highlight the importance of understanding the impact of variations in employee entrepreneurial orientation. This is especially true in light of the nuanced but important difference in the effects of employee innovativeness, proactiveness, and risk-taking on firm performance. Managers should avoid blanket application of the IEO assumption that proactiveness, risk-taking, and innovativeness automatically positively affect digitalization-related performance. Instead, our findings suggest that managers should consider tailoring operational initiatives to employee capabilities that best align with the organization's strategic intent and relational structure. An innovative orientation to one digital strategy goal may require a different density of relational capital than goals that require proactiveness. This shifts the emphasis away from the

Table 6
Regression results: Digital Development Performance (standard errors in parentheses).

	<i>Model 1:</i>		<i>Model 2:</i>		<i>Model 3:</i>	
Control variables						
Age	-0.02	(0.31)	-0.01	(0.31)	-0.01	(0.31)
University education	0.11	(0.25)	0.11	(0.25)	0.12	(0.25)
Managerial position	0.05	(0.28)	0.03	(0.28)	0.05	(0.28)
Organizational experience (yrs)	-0.05	(0.02)	-0.03	(0.02)	-0.05	(0.02)
Industry experience (yrs)	-0.28 [†]	(0.02)	-0.33	(0.02)	-0.31	(0.02)
Digital unit	0.28**	(0.37)	0.27**	(0.36)	0.27**	(0.36)
Life cycle unit	0.15 [†]	(0.39)	0.12	(0.39)	0.15	(0.39)
Sales & marketing unit	0.13	(0.46)	0.10	(0.46)	0.11	(0.46)
Specialized unit	0.17 [†]	(0.38)	0.19*	(0.38)	0.17 [†]	(0.38)
Other units	0.11	(0.46)	0.10	(0.45)	0.10	(0.45)
Self-efficacy	0.09	(0.18)	-0.04	(0.20)	-0.02	(0.21)
External relational capital	0.28**	(0.15)	0.26**	(0.15)	0.24*	(0.12)
Internal relational capital	-0.10	(0.16)	-0.13	(0.15)	-0.14	(0.15)
Focus variables						
Proactiveness & risk-taking orientation			0.27**	(0.17)	0.26*	(0.17)
Innovativeness orientation			-0.03	(0.13)	0.00	(0.13)
Interaction effects						
Proactiveness & risk-taking orientation × Internal relational capital					-0.02	(0.09)
Innovativeness orientation × Internal relational capital					-0.15 [†]	(0.12)
F	3.87**		3.97**		3.79**	
F change			3.71*		2.03	
R ²	0.25		0.29		0.31	

[†] $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$ (two-tailed).

technology dimension of digitalization and towards employee orientation as a relevant and non-trivial component in effectively leveraging digital strategy.

Furthermore, our results provide pragmatic implications to several contemporary developments and contingencies. First, as shown in several recent studies, the COVID-19 crisis has significantly accelerated digitalization across different industries and among different types of companies (see, e.g., Kraus et al., 2020; Faraj et al., 2021; Klein and Todesco, 2021; Leppäaho and Ritala, 2021). At the same time, the “digital divide” (Shakina et al., 2021) among digital winners and digital laggards becomes more apparent. Therefore, the need for digital strategy and strategizing (Volberda et al., 2021) is more important than ever. Our findings support harnessing the entrepreneurial and pro-active orientations of employees in accelerating the adoption of digital tools and processes in organizations. However, there are limits to how much managers should encourage relational capital among employees. While beneficial to those proactive and risk-oriented, overlying on relational ties with other employees can diminish the benefits of an innovativeness orientation. Second, digital strategies increasingly contribute to corporate sustainability and sustainable development. Entrepreneurial firms can utilize digital technologies to address grand challenges such as climate change (George et al., 2020) and achieve green growth (Fernandes et al., 2021). Furthermore, new forms of organizing such as digital platforms can enable circular economy business models, allowing for more efficient usage of resources and the circulation of excess resources across different stakeholders (Ciulli et al., 2020; Bocken and Ritala, 2021), and support sustainable business models (Ferreira et al.,

2021). Overall, our results provide insights into the individual employee profiles we expect to build “digitally agile” organizations.

5.3. Limitations and future research

Most important limitations relate to generalizability, given the overall context of a single organization in one industry sector in one country. Nevertheless, a response rate of 40% provides valuable first insights into the interplay of IEO and employee contributions to achieving digitalization goals in an organizational setting. As this study relied on self-reported data and subjective performance indicators, future research should also gather more objective performance data; even if previous entrepreneurship research confirms that perceived measures of performance and archival measures are strongly correlated (Sarkar et al., 2001). In any case, alternative measures of IEO performance outcomes will prove useful in future studies. Further, as there is as yet no generally accepted scale for IEO – and as we found a two-dimensional solution instead of a unified or a threefold measure – future research should address this problem by developing a scale using large or comparative datasets. Moreover, the concrete relationship between IEO and firm-level EO remains unclear. These relationships may be studied from a microfoundations view to ascertain whether firm EO is a sum of all IEO, whether pockets of IEO across the firm do more harm than good, and whether IEO among select groups of employees has greater weight on the emergence of firm EO. At its core, firm EO originates from the disposition of senior managers, representing upper echelon logic. Thus, multilevel modeling should seek to answer whether a bottom-up, microfoundations logic is superior to upper echelon logic, or vice versa. Similarly, further studies could go deeper into the relationships between IEO and relational capital. While we examined internal relational capital as a moderator for the effect of IEO on performance, further studies could examine, for example, mediation models where IEO would act as an antecedent to building relational capital, which then would contribute to different outcomes. Finally, while our study focused on individuals’ contribution to firms’ digital strategy, we also recognize that technology acceptance (Davis, 1989; Davis et al., 1989) could play an additional role in the individuals’ attitudes and abilities in the context of digital strategy. While we focused on the role of IEO in this paper, we leave the consideration of the additional role of technology acceptance for further studies.

CRedit authorship contribution statement

Paavo Ritala: Conceptualization, Methodology, Writing – original draft. **Abayomi Baiyere:** Conceptualization, Investigation, Writing – original draft. **Mathew Hughes:** Writing – original draft. **Sascha Kraus:** Writing – original draft.

Acknowledgements

We want to thank PoDoCo – Post Docs in Companies – for financial support regarding this research. We also want to thank Hannu Salmela, Matti Mäntymäki, and Milla Wirren for their support.

Appendix

Measures and reliabilities of multi-item constructs used in the study

Digital management performance ($\alpha = 0.88$)

Digital Management Capability refers to the ability of the organization to plan and orchestrate its digital resources towards making strategic decisions and choices in alignment with the organization’s overall goals and vision.

Our firm is able to effectively reach this goal / my abilities contribute towards reaching this goal

(1 = completely disagree, 7 = completely agree)

- 1 To implement a profitable digital business
- 2 To make quick consistent and clear digital business decisions

Digital infrastructure performance ($\alpha = 0.80$)

Digital Infrastructure Capability defines the human and technological digital asset of an organization, which determines the extent to which it can exploit the benefits of its digital/IT investments. It reflects the possibilities afforded by both the tangible and intangible digital resources of the organization.

Our firm is able to effectively reach this goal / my abilities contribute towards reaching this goal

(1 = completely disagree, 7 = completely agree)

- 1 To create customer and business value from our data resources
- 2 To have a trusted and secure data infrastructure

Digital networking performance ($\alpha = 0.84$)

Digital Networking/Sourcing Capability is the ability of an organization to harness digital assets that exist or resides outside its organizational borders. This is determined by the ability; speed and effectiveness with which organizations can access; utilize and take advantage of external digital resources.

Our firm is able to effectively reach this goal / my abilities contribute towards reaching this goal

(1 = completely disagree, 7 = completely agree)

- 1 To optimize the use of external digital resources
- 2 Proactive awareness of trends and relevant opportunities

Digital development performance ($\alpha = 0.87$)

Digital Development Capability is the extent to which an organization can deploy its digital resources to meet the current/emerging business, operational and service needs of the organization.

Our firm is able to effectively reach this goal / my abilities contribute towards reaching this goal

(1 = completely disagree, 7 = completely agree)

- 1 Co-creating with customers to solve important problems
- 2 Efficient and flexible approach to development projects

Proactiveness and risk-taking orientation ($\alpha = 0.88$)

Please assess to which extent you agree with the following statements regarding your own behavior and characteristics in a scale of 1–7 (1 = Strongly disagree, 7 = strongly agree):

- 1 I usually act in anticipation of future problems, needs or changes and initiate actions to which others respond.
- 2 I excel at identifying opportunities and tend to plan ahead on projects.
- 3 I prefer to “step-up” and get things going on projects always trying to take the initiative in every situation rather than sit and wait for someone else to do it.
- 4 I like to take bold action by venturing into the unknown encouraged to take calculated risks with new ideas.
- 5 I am willing to invest a lot of time and/or money on something that might yield a high return taking bold, wide-ranging actions to achieve my objectives.
- 6 When confronted with decisions involving uncertainty, I tend to act “boldly” in situations where risk is involved.

Innovativeness orientation ($\alpha = 0.80$)

Please assess to which extent you agree with the following statements regarding your own behavior and characteristics in a scale of 1–7 (1 = Strongly disagree, 7 = strongly agree):

- 1 In general, I prefer a strong emphasis in projects on unique, one-of-a-kind approaches rather than revisiting tried and true approaches used before.
- 2 I prefer to try my own unique way when learning new things rather than doing it like everyone else does.
- 3 I favor experimentation and original approaches to problem solving rather than using methods others generally use for solving their problems.

Internal relational capital ($\alpha = 0.74$)

Please assess to which extent you agree with the following statements regarding your internal collaboration in your company in a scale of 1–7 (1 = Strongly disagree, 7 = strongly agree):

- 1 I have a good understanding of my colleagues working within different units or functions of our company.
- 2 I frequently collaborate with my colleagues in our company to solve problems.
- 3 My collaboration with my company colleagues runs smoothly.

External relational capital ($\alpha = 0.82$)

Please assess to which extent you agree with the following statements regarding your external collaboration in your company in a scale of 1–7 (1 = Strongly disagree, 7 = strongly agree):

- 1 I have a good understanding of external stakeholders to our company – such as customers, suppliers, and partners
- 2 I frequently collaborate with our external stakeholders to solve problems.
- 3 My collaboration with our external stakeholders runs smoothly.

Self-efficacy ($\alpha = 0.92$)

Please assess to which extent you agree with the following statements regarding your own abilities in a scale of 1–7 (1 = Strongly disagree, 7 = strongly agree):

- 1 I will be able to achieve most of the goals that I have set for myself.
- 2 When facing difficult tasks, I am certain that I will accomplish them.
- 3 In general, I think that I can obtain outcomes that are important to me.
- 4 I believe I can succeed at most any endeavor to which I set my mind.
- 5 I will be able to successfully overcome many challenges.
- 6 I am confident that I can perform effectively on many different tasks.
- 7 Compared to other people, I can do most tasks very well.
- 8 Even when things are tough, I can perform quite well

References

- Amit, R., Zott, C., 2001. Value creation in e-business. *Strategic Manag. J.* 22 (6–7), 493–520.
- Anderson, N.R., West, M.A., 1998. Measuring climate for work group innovation: development and validation of the team climate inventory. *J. Org. Behav.* 19 (3), 235–258.
- Antoncic, B., Prodan, I., 2008. Alliances, corporate technological entrepreneurship and firm performance: testing a model on manufacturing firms. *Technovation* 28 (5), 257–265.
- Autio, E., Nambisan, S., Thomas, L.D., Wright, M., 2018. Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strategic Entrepreneur. J.* 12 (1), 72–95.
- Baiyere, A., Salmela, H., Tapanainen, T., 2020. Digital transformation and the new logics of business process management. *Eur. J. Inf. Syst.* 29 (3), 238–259.
- Baiyere, A., Salmela, H., 2014. Towards a Unified View of Information System (IS) Capability. In *Pacific Asian Conf. Inf. Syst. Chengdu China*. June 2014 ISBN 978-988-8353-22-4 <https://aisel.aisnet.org/pacis2014/329>.
- Baiyere, A., Salmela, H., 2015. IS Capability Assessment-The MIND canvas. In *Design Science Research in Information Systems and Technology. In At the Vanguard of Design Science: First Impressions and Early Findings from Ongoing Research Research-in-Progress Papers and Poster Presentations from the 10th International Conference, DESRIST 2015, Dublin, Ireland*, pp. 131–132, 20–22 May.

- Baiyere, A., 2017. MIND—An IT/IS Capability assessment Framework. In proceedings of the Twenty-third Americas Conference on Information Systems, Boston, USA. August 2017.
- Barney, J.B., Foss, N.J., Lyngsie, J., 2018. The role of senior management in opportunity formation: direct involvement or reactive selection? *Strategic Manag. J.* 39 (5), 1325–1349.
- Baskerville, R., Baiyere, A., Gregor, S., Hevner, A., Rossi, M., 2018. Design science research contributions: finding a balance between artifact and theory. *J. Assoc. Inf. Syst.* 19 (5), 3.
- Berends, H., Lammers, I., 2010. Explaining discontinuity in organizational learning: a process analysis. *Org. Stud.* 31 (8), 1045–1068.
- Bharadwaj, A., El Sawy, O.A., Pavlou, P.A., Venkatraman, N., 2013. Digital business strategy: toward a next generation of insights. *MIS Q.* 471–482.
- Bocken, N., Ritala, P., 2021. Six ways to build circular business models. *J. Bus. Strategy*. <https://doi.org/10.1108/JBS-11-2020-0258>.
- Bolino, M.C., Turnley, W.H., Bloodgood, J.M., 2002. Citizenship behavior and the creation of social capital in organizations. *Acad. Manag. Rev.* 27 (4), 505–522.
- Bolton, D.L., 2012. Individual entrepreneurial orientation: further investigation of a measurement instrument. *Acad. Entrepreneur. J.* 18 (1), 91–98.
- Brøndum, K., 2019. New insights on innovative individuals: uncovering the characteristics of corporate entrepreneurs. *J. Creativ. Bus. Innovat.* 5, 109–131.
- Büschgens, T., Bausch, A., Balkin, D.B., 2013. Organizational culture and innovation: a meta-analytic review. *J. Product Innovat. Manag.* 30 (4), 763–781.
- Camps, S., Marques, P., 2014. Exploring how social capital facilitates innovation: the role of innovation enablers. *Technol. Forecast. Soc. Change* 88, 325–348.
- Ceipek, R., Hautz, J., Petruzzelli, A.M., De Massis, A., Matzler, K., 2020. A motivation and ability perspective on engagement in emerging digital technologies: the case of Internet of Things solutions. *Long Range Planning*, in press, 101991.
- Chen, G., Gully, S.M., Eden, D., 2001. Validation of a New General Self-Efficacy Scale. *Organ. Res. Methods* 4 (1), 62–83.
- Ciulli, F., Kolk, A., Boe-Lillegraven, S., 2020. Circularity brokers: digital platform organizations and waste recovery in food supply chains. *J. Bus. Ethics* 167 (2), 299–331.
- Covin, J.G., Miller, D., 2014. International entrepreneurial orientation: conceptual considerations, research themes, measurement issues, and future research directions. *Entrepreneur. Theory Practice* 38 (1), 11–44.
- Covin, J.G., Slevin, D., 1989. Strategic management in small firms in hostile and benign environments. *Strategic Manag. J.* 10 (1), 75–87.
- Covin, J.G., Wales, W.J., 2019. *Crafting High-Impact Entrepreneurial Orientation Research: Some Suggested Guidelines*. SAGE Publications Sage CA, Los Angeles, CA.
- Covin, J.G., Rigtering, J.C., Hughes, M., Kraus, S., Cheng, C.F., Bouncken, R.B., 2020. Individual and team entrepreneurial orientation: scale development and configurations for success. *J. Bus. Res.* 112, 1–12.
- Cragg, P., Caldeira, M., Ward, J., 2011. Organizational information systems competences in small and medium-sized enterprises. *Inf. Manag.* 48 (8), 353–363.
- Croonen, E.P., Brand, M.J., Huizingh, E.K., 2016. To be entrepreneurial, or not to be entrepreneurial? Explaining differences in franchisee entrepreneurial behavior within a franchise system. *Int. Entrepreneur. Manag. J.* 12 (2), 531–553.
- Cross, R., Gray, P., 2013. Where has the time gone? Addressing collaboration overload in a networked economy. *Calif. Manage. Rev.* 56 (1), 50–66.
- Davis, F., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q.* 13 (3), 319–339.
- Davis, F., Bagozzi, R., Warshaw, P., 1989. User acceptance of computer technology: a comparison of two. *Manage. Sci.* 35 (8), 982–1004.
- De Jong, J.P., Parker, S.K., Wennekers, S., Wu, C.H., 2015. Entrepreneurial behavior in organizations: does job design matter? *Entrepreneur. Theory Practice* 39 (4), 981–995.
- Dokko, G., Wilk, S.L., Rothbard, N.P., 2009. Unpacking prior experience: how career history affects job performance. *Org. Sci.* 20 (1), 51–68.
- Escribá-Carda, N., Revuelto-Taboada, L., Canet-Giner, M.T., Balbastre-Benavent, F., 2020. Fostering intrapreneurial behavior through human resource management system. *Baltic J. Manag.* 15 (3), 355–373.
- Edelman, F., Bresnen, M., Newell, S., Scarbrough, H., Swan, J., 2004. The benefits and pitfalls of social capital: empirical evidence from two organizations in the United Kingdom. *Brit. J. Manag.* 15 (S1), S59–S69.
- Elia, G., Margherita, A., 2018. Assessing the maturity of crowdventuring for corporate entrepreneurship. *Bus. Horiz.* 61 (2), 271–283.
- Elia, G., Margherita, A., Passiante, G., 2020. Digital entrepreneurship ecosystem: how digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technol. Forecast. Soc. Change* 150, 119791.
- Faraj, S., Renno, W., Bhardwaj, A., 2021. Unto the breach: what the COVID-19 pandemic exposes about digitalization. *Inf. Org.* 31 (1), 100337.
- Fellnhöfer, K., Puumalainen, K., Sjögrén, H., 2017. Entrepreneurial orientation in work groups—effects of individuals and group characteristics. *Int. Entrepreneur. Manag. J.* 13 (2), 427–463.
- Fernandes, C.I., Veiga, P.M., Ferreira, J.J.M., Hughes, M., 2021. Green growth versus economic growth: do sustainable technology transfer and innovations lead to an imperfect choice? *Bus. Strategy Environ.* 30 (4), 2021–2037.
- Ferreira, J.J., Fernandes, C.I., Veiga, P.M., Hughes, M., 2021. Prevailing theoretical approaches predicting sustainable business models: a systematic review. *Int. J. Product. Perform. Manag.* <https://doi.org/10.1108/IJPPM-12-2020-0653> in press. DOI:
- Foss, N.J., Klein, P.G., 2012. *Organizing Entrepreneurial Judgment: A New Approach to the Firm*. Cambridge University Press.
- Fürstenau, D., Baiyere, A., Kliewer, N., 2019. A dynamic model of embeddedness in digital infrastructures. *Inf. Syst. Res.* 30 (4), 1319–1342.
- George, G., Merrill, R.K., Schillebeeckx, S.J., 2020. Digital sustainability and entrepreneurship: how digital innovations are helping tackle climate change and sustainable development. *Entrepreneur. Theory Practice*. <https://doi.org/10.1177/1042258719899425>.
- Ghosh, S., Hughes, M., Hughes, P., Hodgkinson, I.H., 2020. Corporate digital entrepreneurship: leveraging industrial internet of things and emerging technologies. In: Soltanifar, M., Hughes, M., Göcke, L. (Eds.), *Digital Entrepreneurship: Impact on Business and Society*. Springer, Cham. CC-BY, pp. 183–207, 978-3-030-53913-9.
- Gilbert, C.G., 2006. Change in the presence of residual fit: can competing frames coexist? *Org. Sci.* 17 (1), 150–167.
- Grant, R.M., 2015. *Contemporary Strategy Analysis. 9th ed.* John Wiley & Sons, New York, NY.
- Gregor, S., Hevner, A.R., 2013. Positioning and presenting design science research for maximum impact. *MIS Q.* 337–355.
- Grover, V., Kohli, R., 2013. Revealing your hand: caveats in implementing digital business strategy. *Mis Q.* 655–662.
- Hansen, M.T., 1999. The search-transfer problem: the role of weak ties in sharing knowledge across organization subunits. *Adm. Sci. Q.* 44 (1), 82–111.
- Hansen, R., Sia, S.K., 2015. Hummel's digital transformation toward omnichannel retailing: key lessons learned. *MIS Q. Executive* 14 (2).
- Hayton, J.C., Kelley, D.J., 2006. A competency-based framework for promoting corporate entrepreneurship. *Hum. Resour. Manage.* 45 (3), 407–427.
- Henaio-García, E.A., Arias-Pérez, J., Lozada-Barahona, N.E., 2020. Corporate entrepreneurship, resources, capabilities and institutional factors: an analysis for emerging markets. *Int. J. Bus. Innovat. Res.* 22 (1), 106–125.
- Henttonen, K., Kianto, A., Ritala, P., 2016. Knowledge sharing and individual work performance: an empirical study of a public sector organisation. *J. Know. Manag.* 20 (4), 749–768.
- Herrero, I., Hughes, M., 2019. When family social capital is too much of a good thing. *J. Family Bus. Strategy* 10 (3), 100271.
- Hess, T., Matt, C., Benlian, A., Wiesböck, F., 2016. Options for formulating a digital transformation strategy. *MIS Q. Execut.* 15 (2), Article 6.
- Hevner, A., March, S.T., Park, J., Ram, S., 2004. Design science research in information systems. *MIS Q.* 28 (1), 75–105.
- Heyden, M.L., Sidhu, J.S., Volberda, H.W., 2018. The conjoint influence of top and middle management characteristics on management innovation. *J. Manage.* 44 (4), 1505–1529.
- Holden, R.R., 2010. Face validity. *Corsini Encyclop. Psychol.* <https://doi.org/10.1002/9780470479216.corpsy0341>.
- Hughes, M., Morgan, R.E., 2007. Deconstructing the relationship between entrepreneurial orientation and business performance at the embryonic stage of firm growth. *Ind. Market. Manag.* 36 (5), 651–661.
- Hughes, M., Chang, Y.-Y., Hodgkinson, I.R., Hughes, P., Chang, C.-Y., 2021. The multi-level effects of corporate entrepreneurial orientation on business unit radical innovation and financial performance. *Long Range Plann.* 54 (1), 101989.
- Hughes, M., Rigtering, J.P.C., Covin, J.G., Bouncken, R.B., Kraus, S., 2018. Innovative Behaviour, Trust and Perceived Workplace Performance. *Brit. J. Manag.* 29 (4), 750–768.
- Inkinen, H., Kianto, A., Vanhala, M., Ritala, P., 2017. Structure of intellectual capital—an international comparison. *Account. Audit. Accountab. J.* 30 (5), 1160–1183.
- Jiang, F., Wang, G., Jiang, X., 2019. Entrepreneurial orientation and organizational knowledge creation: a configurational approach. *Asia Pacific J. Manag.* <https://doi.org/10.1007/s10490-018-9609-5> in press.
- Kattenbach, R., Fietze, S., 2018. Entrepreneurial orientation and the job demands-resources model. *Personnel Rev.* 47 (3), 745–764.
- Keil, T., Maula, M., Syrigos, E., 2017. CEO entrepreneurial orientation, entrenchment, and firm value creation. *Entrepreneur. Theory Practice* 41 (4), 475–504.
- Kelley, D.J., Peters, L., O'Connor, G.C., 2009. Intra-organizational networking for innovation-based corporate entrepreneurship. *J. Bus. Ventur.* 24 (3), 221–235.
- Klein, V.B., Todesco, J.L., 2021. COVID-19 crisis and SMEs responses: the role of digital transformation. *Knowl. Process Manag.* 28 (2), 117–133.
- Kraus, S., Palmer, C., Kailer, N., Kallinger, F.L., Spitzer, J., 2019a. Digital entrepreneurship: a research agenda on new business models for the twenty-first century. *Int. J. Entrepreneur. Behav. Res.* 25 (2), 353–375.
- Kraus, S., Breier, M., Jones, P., Hughes, M., 2019b. Individual entrepreneurial orientation and intrapreneurship in the public sector. *Int. Entrepreneur. Manag. J.* 15 (4), 1247–1268.
- Kraus, S., Claus, T., Breier, M., Gast, J., Zardini, A., Tiberius, V., 2020. The economics of COVID-19: initial empirical evidence on how family firms in five European countries cope with the corona crisis. *Int. J. Entrepreneur. Behav. Res.* 26 (5), 1067–1092.
- Krotov, V., 2017. The Internet of Things and new business opportunities. *Bus. Horiz.* 60 (6), 831–841.
- Krueger, N., 1993. The impact of prior entrepreneurial exposure on perceptions of new venture feasibility and desirability. *Entrepreneur. Theory Practice* 18 (1), 5–21.
- Langkamp-Bolton, D., Lane, M.D., 2012. Individual entrepreneurial orientation: development of a measurement instrument. *Education + Training* 54 (2/3), 219–233.
- Laursen, K., Salter, A., 2006. Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Manag. J.* 27 (2), 131–150.
- Le Dinh, T., Vu, M.C., Ayayi, A., 2018. Towards a living lab for promoting the digital entrepreneurship process. *Int. J. Entrepreneur.* 22 (1).
- Lee, J.-H., Venkataraman, S., 2006. Aspirations, market offerings, and the pursuit of entrepreneurial opportunities. *J. Bus. Ventur.* 21 (1), 107–123.

- Leppäaho, T., Ritala, P., 2021. Surviving the coronavirus pandemic and beyond: unlocking family firms' innovation potential across crises. *J. Family Bus. Strategy*. <https://doi.org/10.1016/j.jfbs.2021.100440>. In press.
- Loonam, J., Eaves, S., Kumar, V., Parry, G., 2018. Towards digital transformation: lessons learned from traditional organizations. *Strategic Change* 27 (2), 101–109.
- Lumpkin, G.T., Dess, G.G., 1996. Clarifying the entrepreneurial orientation construct and linking it to performance. *Acad. Manag. Rev.* 21 (1), 135–172.
- Lyon, D.W., Lumpkin, G.T., Dess, G.G., 2000. Enhancing entrepreneurial orientation research: operationalizing and measuring a key strategic decision making process. *J. Manage.* 26 (5), 1055–1085.
- Marabelli, M., Galliers, R.D., 2017. A reflection on information systems strategizing: the role of power and everyday practices. *Inf. Syst. J.* 27 (3), 347–366.
- Matt, C., Hess, T., Benlian, A., 2015. Digital transformation strategies. *Bus. Inf. Syst. Eng.* 57 (5), 339–343.
- Maurer, I., Bartsch, V., Ebers, M., 2011. The value of intra-organizational social capital: how it fosters knowledge transfer, innovation performance, and growth. *Org. Stud.* 32 (2), 157–185.
- Martín-Rojas, R., García-Morales, V.J., Bolívar-Ramos, M.T., 2013. Influence of technological support, skills and competencies, and learning on corporate entrepreneurship in European technology firms. *Technovation* 33 (12), 417–430.
- Mirvis, P.H., Sales, A.L., Hackett, E.J., 1991. The implementation and adoption of new technology in organizations: the impact on work, people, and culture. *Hum. Resour. Manage.* 30 (1), 113–139.
- Mithas, S., Tafti, A., Mitchell, W., 2013. How a Firm's competitive environment and digital strategic posture influence digital business strategy. *MIS Q.* 37 (2).
- Mom, T.J., Van Den Bosch, F.A., Volberda, H.W., 2007. Investigating managers' exploration and exploitation activities: the influence of top-down, bottom-up, and horizontal knowledge inflows. *J. Manag. Stud.* 44 (6), 910–931.
- Mom, T.J., van Neerijnen, P., Reinmoeller, P., Verwaal, E., 2015. Relational capital and individual exploration: unravelling the influence of goal alignment and knowledge acquisition. *Org. Stud.* 36 (6), 809–829.
- Moran, P., 2005. Structural vs. relational embeddedness: social capital and managerial performance. *Strategic Manag. J.* 26 (12), 1129–1151.
- Mustafa, M., Martin, L., Hughes, M., 2016. Psychological ownership, job satisfaction, and middle manager entrepreneurial behavior. *J. Leadership Org. Stud.* 23 (3), 272–287.
- Mustafa, M., Gavin, F., Hughes, M., 2018. Contextual determinants of employee entrepreneurial behavior in support of corporate entrepreneurship: a systematic review and research Agenda. *J. Enterpris. Culture* 26 (03), 285–326.
- Nahapiet, J., Ghoshal, S., 1998. Social capital, intellectual capital, and the organizational advantage. *Acad. Manag. Rev.* 23 (2), 242–266.
- Nambisan, S., 2017. Digital entrepreneurship: toward a digital technology perspective of entrepreneurship. *Entrepreneur. Theory Practice* 41 (6), 1029–1055.
- Neumann, S., Fink, L., 2007. Gaining agility through IT personnel capabilities: the mediating role of IT infrastructure capabilities. *J. Assoc. Inf. Syst.* 8 (8), 25.
- Ng, T.W., Feldman, D.C., 2008. The relationship of age to ten dimensions of job performance. *J. Appl. Psychol.* 93 (2), 392.
- Ng, T.W., Feldman, D.C., 2009. How broadly does education contribute to job performance? *Pers. Psychol.* 62 (1), 89–134.
- Nickerson, J.A., Silverman, B.S., Zenger, T.R., 2007. The problem of creating and capturing value. *Strategic Org.* 5 (3), 211–225.
- Niemand, T., Rigtering, J.C., Kallmünzer, A., Kraus, S., Maalaoui, A., 2020. Digitalization in the financial industry: a contingency approach of entrepreneurial orientation and strategic vision on digitalization. *Eur. Manag. J.* <https://doi.org/10.1016/j.emj.2020.04.008>.
- Nonaka, I., Byosiére, P., Borucki, C.C., Konno, N., 1994. Organizational knowledge creation theory: a first comprehensive test. *Int. Bus. Rev.* 3 (4), 337–351.
- Peppard, J., Ward, J., 2004. Beyond strategic information systems: towards an IS capability. *J. Strategic Inf. Syst.* 13 (2), 167–194.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J. Appl. Psychol.* 88 (5), 879–903.
- Polzer, J.T., DeFilippis, E., 2020. The consequences of collaboration overload. In *Acad. Manag. Proc.* (Vol. 2020, No. 1, p. 21045).
- Quinn, R.E., Rohrbaugh, J., 1983. A spatial model of effectiveness criteria: towards a competing values approach to organizational analysis. *Manage. Sci.* 29 (3), 363–377.
- Ravichandran, T., Lertwongsatien, C., Lertwongsatien, C., 2005. Effect of information systems resources and capabilities on firm performance: a resource-based perspective. *J. Manag. Inf. Syst.* 21 (4), 237–276.
- Ritala, P., Olander, H., Michailova, S., Husted, K., 2015. Knowledge sharing, knowledge leaking and relative innovation performance: an empirical study. *Technovation* 35, 22–31.
- Ritala, P., Vanhala, M., Järveläinen, K., 2020. The role of employee incentives and motivation on organisational innovativeness in different organisational cultures. *Int. J. Innovat. Manag.* 24 (04), 2050075.
- Ross, J.W., Beath, C.M., Sebastian, I.M., 2017. How to develop a great digital strategy. *MIT Sloan Manag. Rev.* 58 (2), 7.
- Rossiter, J.R., 2008. Content validity of measures of abstract constructs in management and organizational research. *Brit. J. Manag.* 19 (4), 380–388.
- Sambamurthy, V., Bharadwaj, A., Grover, V., 2003. Shaping agility through digital options: reconceptualizing the role of information technology in contemporary firms. *MIS Q.* 27 (2), 237–263.
- Sarkar, M.B., Echambadi, R.A.J., Harrison, J.S., 2001. Alliance entrepreneurship and firm market performance. *Strategic Manag. J.* 22 (6–7), 701–711.
- Schweer, M., Assimakopoulos, D., Cross, R., Thomas, R.J., 2012. Building a well-networked organization. *MIT Sloan Manag. Rev.* 53 (2), 35.
- Schmidt, F.L., Hunter, J.E., Outerbridge, A.N., 1986. Impact of job experience and ability on job knowledge, work sample performance, and supervisory ratings of job performance. *J. Appl. Psychol.* 71 (3), 432–439.
- Scott, S.A., Hughes, M., Ribeiro-Soriano, D., 2021. Towards a network-based view of effective entrepreneurial ecosystems. *Rev. Manag. Sci.* in press.
- Selander, L., Henfridsson, O., Svahn, F., 2013. Capability search and redeem across digital ecosystems. *J. Inf. Technol.* 28 (3), 183–197.
- Setia, P., Setia, P., Venkatesh, V., Joglekar, S., 2013. Leveraging digital technologies: how information quality leads to localized capabilities and customer service performance. *MIS Q.*, pp. 565–590.
- Shakina, E., Parshakov, P., Alshufey, A., 2021. Rethinking the corporate digital divide: the complementarity of technologies and the demand for digital skills. *Technol. Forecast. Soc. Change* 162, 120405.
- Shalley, C.E., Gilson, L.L., Blum, T.C., 2009. Interactive effects of growth need strength, work context, and job complexity on self-reported creative performance. *Acad. Manag. J.* 52 (3), 489–505.
- Sheremata, W.A., 2000. Centrifugal and centripetal forces in radical new product development under time pressure. *Acad. Manag. Rev.* 25 (2), 389–408.
- Sia, S.K., Soh, C., Weill, P., 2016. How DBS bank pursued a digital business strategy. *MIS Q. Execut.* 15 (2).
- Spender, J.C., 1996. Making knowledge the basis of a dynamic theory of the firm. *Strategic Manag. J.* 17 (S2), 45–62.
- Stewart, W.H., Watson, W.E., Carland, J.C., Carland, J.W., 1998. A proclivity for entrepreneurship: a comparison of entrepreneurs, small business owners, and corporate managers. *J. Bus. Ventur.* 14 (2), 189–215.
- Sund, K.J., Bogers, M., Villarroel, J.A., Foss, N., 2016. Managing tensions between new and existing business models. *MIT Sloan Manag. Rev.* 57 (4), 8.
- Teece, D.J., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. *Strategic Manag. J.* 18 (7), 509–533.
- Theodosiou, M., Katsikea, E., 2012. Antecedents and performance of electronic business adoption in the hotel industry. *Eur. J. Mark.* 46 (1/2), 258–283.
- Tilson, D., Lyytinen, K., Sørensen, C., 2010. Digital infrastructures: the missing IS research agenda. *Inf. Syst. Res.* 21 (4), 748–759.
- Tripsas, M., Gavetti, G., 2000. Capabilities, cognition, and inertia: evidence from digital imaging. *Strategic Manag. J.* 21 (10–11), 1147–1161.
- Tumbas, S., Berente, N., vom Brocke, J., 2017. Three types of chief digital officers and the reasons organizations adopt the role. *MIS Q. Execut.* 16 (2).
- Turnipseed, D.L., Rassuli, A., 2005. Performance perceptions of organizational citizenship behaviours at work: a bi-level study among managers and employees. *Brit. J. Manag.* 16 (3), 231–244.
- Uhl, A., Born, M., Koschmider, A., Janasz, T., 2016. Digital capability framework: a toolset to become a digital enterprise. In *Digital Enterprise Transformation* 27–60. Routledge.
- Van Wijk, R., Jansen, J.J., Lyles, M.A., 2008. Inter- and intra-organizational knowledge transfer: a meta-analytic review and assessment of its antecedents and consequences. *Journal of Management Studies* 45 (4), 830–853.
- vom Brocke, J., Winter, R., Hevner, A., Maedche, A., 2020. Accumulation and evolution of design knowledge in design science research – a journey through time and space. *J. Assoc. Inf. Syst.* 21 (3), 520–544.
- Von Nordenflycht, A., 2010. What is a professional service firm? Toward a theory and taxonomy of knowledge-intensive firms. *Acad. Manag. Rev.* 35 (1), 155–174.
- Volberda, H.W., Khanagha, S., Baden-Fuller, C., Mihalache, O.R., & Birkinshaw, J. (2021). Strategizing in a digital world: overcoming cognitive barriers, reconfiguring routines and introducing new organizational forms. DOI: 10.1016/j.lrp.2021.102110.
- Wade, M., Hulland, J., 2004. The resource-based view and information systems research: review, extension, and suggestions for future research. *MIS Q.* 28 (1), 107–142.
- Wales, W.J., Gupta, V.K., Mousa, F.-T., 2013. Empirical research on entrepreneurial orientation: an assessment and suggestions for future research. *Int. Small Bus. J.* 31 (4), 357–383.
- Wales, W.J., Kraus, S., Filser, M., Stöckmann, C., Covin, J.G., 2021. The status quo of research on entrepreneurial orientation: conversational landmarks and theoretical scaffolding. *J. Bus. Res.* 128, 564–577.
- Warner, K.S., Wäger, M., 2019. Building dynamic capabilities for digital transformation: an ongoing process of strategic renewal. *Long Range Plann.* 52 (3), 326–349. <https://doi.org/10.1016/j.lrp.2018.12.001>.
- Weill, P., Woerner, S.L., 2018. Is your company ready for a digital future? *MIT Sloan Manag. Rev.* 59 (2), 21–25.
- Wessel, L., Baijere, A., Ologeanu-Taddei, R., Cha, J., Blegind Jensen, T., 2021. Unpacking the difference between digital transformation and IT-enabled organizational transformation. *J. Assoc. Inf. Syst.* 22 (1), 6.
- Westerman, G., Bonnet, D., McAfee, A., 2012. The digital capabilities your company needs. *MIT Sloan Manag. Rev.* 1–5.
- Westerman, G., Bonnet, D., McAfee, A., 2014. *Leading Digital: Turning Technology into Business Transformation*. Harvard Business Press.
- Wu, I.-L., Wu, K.-W., 2005. A hybrid technology acceptance approach for exploring e-CRM adoption in organizations. *Behav. Inf. Technol.* 24 (4), 303–316.
- Yoo, Y., Henfridsson, O., Lyytinen, K., 2010. Research commentary—The new organizing logic of digital innovation: an agenda for information systems research. *Inf. Syst. Res.* 21 (4), 724–735.

- Zaheer, H., Breyer, Y., Dumay, J., 2019. Digital entrepreneurship: an interdisciplinary structured literature review and research agenda. *Technol. Forecast. Soc. Change* 148, 119735.
- Zampetakis, L.A., Moustakis, V.S., 2010. An exploratory research on the factors stimulating corporate entrepreneurship in the Greek public sector. *Int. J. Manpow.* 31 (8), 871–887.
- Zimmer, M.P., Baiyere, A., Salmela, H., 2020. Digital workplace transformation: the importance of deinstitutionalising the taken for granted. In *Eur. Conf. Inf. Syst.*

Paavo Ritala is a Professor of Strategy and Innovation at the School of Business and Management at LUT University, Finland. His main research themes include collaborative innovation, co-competition, knowledge sharing and protection, digital strategy, platforms and ecosystems, as well as sustainable value creation. His research has been published in journals such as *Journal of Management*, *Research Policy*, *Journal of Product Innovation Management*, *Long Range Planning*, *Industrial and Corporate Change*, *California Management Review*, *Technological Forecasting & Social Change*, *Technovation*, *R&D Management*, *British Journal of Management*, and *Industrial Marketing Management*. He is also closely involved with business practice through company-funded research projects, executive and professional education programs, and in speaker and advisory roles. Prof. Ritala is the Co-Editor-in-Chief of *R&D Management* from July 2021 onwards.

Abayomi Bayere is an Assistant Professor at Digitalization Department of Copenhagen Business School; a Research Affiliate at MIT Sloan Center for Information Systems Research and a visiting scholar at University of Turku. Before joining academia, he worked for companies such as SAP, ABN AMRO (Dialogues Incubator) and as an Entrepreneur. His

research interest seats at the intersection of digital innovations, digital disruption and the societal impact of digitalization. He currently serves as an associate editor of *Information Systems Journal - ISJ* and invited guest editor for special issues in *Technology Innovation Management and Information Technology for Development*. His work has been accepted in journals such as *Information Systems Research (ISR)*, *Journal of the Association for Information Systems (JAIS)*, *European Journal of Information Systems (EJIS)* and *Technovation*.

Mathew Hughes is Professor of Entrepreneurship and Innovation at Loughborough University School of Business and Economics. His expertise centers on the strategy and management of entrepreneurship and innovation. His research interests include entrepreneurial orientation and entrepreneurial behavior, organizational and innovation ambidexterity, social capital and absorptive capacity, and Mat studies these phenomena across a range of context including family and nonfamily firms.

Sascha Kraus is Full Professor of Management at the Free University of Bozen-Bolzano, Italy. He holds a doctorate in Social and Economic Sciences from Klagenfurt University, Austria, a Ph.D. in Industrial Engineering and Management from Helsinki University of Technology and a Habilitation (Venia Docendi) from Lappeenranta University of Technology, both in Finland. Before, he held Full Professor positions at Utrecht University, The Netherlands, the University of Liechtenstein, École Supérieure du Commerce Extérieur Paris, France, and at Durham University, United Kingdom. He also held Visiting Professor positions at Copenhagen Business School, Denmark and at the University of St. Gallen, Switzerland, and was EECPL Participating Professor at the European Entrepreneurship Colloquium on Participant-Centered Learning (EECPCL) at Harvard University.