Antecedents, consequences, and challenges of small and medium-sized enterprise digitalization

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**Abstract:**

Small and medium-sized enterprises (SMEs) lag behind larger firms when it comes to digitalization. This has negative impacts on firm performance. Despite the economic importance of SMEs, little is known about the antecedents, consequences, and challenges of SME digitalization. We have set three objectives to address this knowledge gap. Drawing on the resource-based view, we first investigate the impact of three main SME resources on digitalization: information technology, employee skills, and digital strategy. Second, we assess the impact digitalization has on financial performance. We then investigate whether digitalization mediates the effect of resources on performance. The results of a survey of 193 SMEs demonstrate how digitalization can impact SME performance, with the three resources positively relating to digitalization. And in turn, digitalization significantly relates to performance, mediating the effect of information technology on performance. It however does not mediate the effect of digital strategy or employee skills on performance.

**Keywords:**

SME digitalization, financial performance, employee skill, digital strategy, resource-based view, digital identity.

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# Introduction

The OECD (2017, p. 36) found that “the uptake of digital technologies remains particularly low among small firms even for technologies that seem particularly relevant for SMEs, such as cloud computing”. According to Li, Su, Zhang, and Mao (2018), the rate at which SMEs embrace digitalization is decidedly mixed. The “ubiquity of non-proprietary technologies and open-access platforms” (Morgan-Thomas, 2016, p. 1122) provides SMEs with unprecedented opportunities to develop their technology infrastructure (Audretsch, Heger, & Veith, 2015). For example, digital technologies can extend an SME’s value proposition and help manage customer relationships with social media (Ainin, Parveen, Moghavvemi, Jaafar, & Mohd Shuib, 2015). The use of social media positively influences the financial performance of SMEs, helping to reduce marketing costs while improving customer relations (Ainin et al., 2015). More generally, SMEs might start digitalizing certain business processes by adopting digital technologies to change the value proposition, value creation and value capture mechanisms, while defining the digitalization scope and level (Bouncken, Kraus, & Roig-Tierno, 2019; Matt, Hess, & Benlian, 2015).

It should also be noted that SMEs possess certain strengths that are harder for larger firms to emulate, including the rate at which they can innovate (Beliaeva, Ferasso, Kraus, & Damke, 2019) and evolve (Fillis & Wagner, 2005) due to their flexibility and coherent culture (Bouncken & Barwinski, 2020; Shepherd & Haynie, 2009). The smallness and flexibility of these firms might also help to improve the creation of positive values and norms towards digitalization, in particular if senior managers have a positive identification with digital technologies which, in turn, they share with their employees. However, despite these opportunities and strengths, Morgan-Thomas (2016, p. 1122) reminds us that “digital technologies represent a key concern for SME managers and policy makers”.

Our paper is situated within the wider conversation concerning a company’s journey from digitization, through digitalization, to digital transformation (Ferreira, Fernandes, & Ferreira, 2019; Sousa & Rocha, 2019; Verhoef et al., 2019). The nascent literature on digitalization highlights the potential advantages that it offers businesses (Kraus, Palmer, Kailer, Kallinger, & Spitzer, 2018; Kraus, Roig-Tierno, & Bouncken, 2019). Recent literature reviews show that digitalization is a multifaceted phenomenon involving multiple levels such as digital entrepreneurship, digital strategies, digital processes, and digital education (Kraus et al., 2018). Publications in recent years have shown the relevance of the topic as well as the further research it requires (Kraus et al., 2019). While the recent flood of academic studies on digitalization and digital transformation are very welcome and provide much-needed clarity, they are largely orientated towards large-firm contexts. The digital transformation imperatives referred to by Verhoef et al. (2019) are beyond the scope of the majority of resource-constrained SMEs. The observation by Li et al. (2018) that SME digital transformation remains an under-researched phenomenon persists.

Our decision to focus on SME digitalization as opposed to SME digital transformation adheres to the adage of walking before you run. Verhoef et al. (2019, p. 4) acknowledge that digital transformation “is the most pervasive and complex phase”; this is exactly why they focus on it. However, the overwhelming majority of resource-constrained SMEs are not equipped for this level of complexity. If, as Verhoef et al. (2019) propose, digitalization is a prerequisite for digital transformation, it is essential that we first develop a better understanding of SME digitalization. They recommend that “future research can also try to measure and investigate how digital readiness of firms may help the transition through the phases of digital transformation” (Verhoef et al., 2019, p. 8). One of our goals in this study is to investigate SMEs’ state of digitalization readiness. We also crucially aim to assess the impact of digitalization on firm performance, which according to Ferreira et al. (2019, p. 584) “remains a largely unexplored topic”. This is a significant knowledge gap, particularly in an SME context where the owners who are highly influential in the firm’s strategic decisions (Jones, Morrish, Deacon, & Miles, 2018) are increasingly likely to adopt technology if they perceive clear benefits from it (Simmons, Armstrong, & Durkin, 2008). The apparent lack of empirical research on the link between the different phases of digital transformation and performance leaves the following question posed by Verhoef et al. (2019, p. 8) largely unanswered: “to what degree should firms transform digitally?”

This paper is structured as follows: 1) the theoretical background frames the hypotheses’ development, 2) the methodology section describes the quantitative research process, 3) the results section reports the analysis’ findings, 4) the results are discussed in the context of the literature, 5) key conclusions and areas for future research are presented.

# Theoretical background and hypothesis development

## SME digitalization: A resource-based view

According to Verhoef et al. (2019), digitalization sits on the continuum from digitization to digital transformation, with each phase having its corresponding resources, structure, growth strategies, metrics, and goals. There is a general consensus in the literature concerning the first phase of digitization. It is understood as a technical process which involves converting analogue signals into digital ones, creating data for information system processing and computation (Autio, Nambisan, Thomas, & Wright, 2018; Tilson, Lyytinen, & Sørensen, 2010; Verhoef et al., 2019). There is, however, less agreement relating to digitalization. Autio et al. (2018) associate transformative effects and business model innovation with digitalization, whereas Verhoef et al. (2019) reserve these characteristics for digital transformation. Academic common ground lies in the recognition that digitalization requires the combination of multiple, complementary resources. According to Autio et al. (2018) and Tilson et al. (2010), digitalization is a socio-technical process, with the OECD (2017, p. 9) pointing out that the successful adoption of information and communication technology (ICT) by SMEs requires “complementary knowledge-based assets, such as organizational and human capital”. The OECD argues that these assets empower SMEs, making it less likely that they become over-dependent on any one technology or platform. The OECD (2017, p. 122) also proposes that “the lack of investment in complementary knowledge may have slowed technology diffusion to smaller and younger firms”. With regard to digital transformation, Rogers (2016, p. 308) states that it “is fundamentally not about technology, but about strategy”. Verhoef et al. (2019, p. 2) concur with this, stating that “digital transformation is multidisciplinary by nature, as it involves changes in strategy, organization, information technology, supply chains and marketing”.

From this multidisciplinary perspective, the resource-based view (RBV) provides a useful lens through which to view SME digitalization. It has been used in information system research in SMEs to unveil relations and capabilities (Lonial & Carter, 2015; Welsh, Davis, Desplaces, & Falbe, 2015). The RBV posits that a firm derives competitive advantage through the combination of valuable, rare, imperfectly imitable, and non-substitutable (VRIN) resources and capabilities under its control (Barney, 2001).

Drawing on the RBV, we review the literature to better understand and develop our hypotheses concerning the relationship that the three key SME resources of information technology (IT), employee skills, and digital strategy have with digitalization.

## Information technology

IT is an umbrella term summarizing technological devices with computing capabilities that support decision making and organizational information processing. The technology landscape is a fast-moving one with new developments including cloud computing (Ross & Blumenstein, 2015), mobile and analytic technologies (Soroka, Liu, Han, & Haleem, 2017), and social networks (Ainin et al., 2015; Stănciulescu & Dumitrescu, 2014; Wu, 2016). IT enables communication, collaboration and computing capabilities to facilitate the development of platforms, digital artefacts and digital infrastructure (Nambisan, 2017). These artefacts, platforms and infrastructures include applications and media content that are central to developing innovative products and services and delivering new value propositions (Bouncken et al., 2019; Nambisan, 2017; Nambisan, Lyytinen, Majchrzak, & Song, 2017). Wu (2016) shows that social media adoption and marketing improve organizational learning and innovation orientation while reinforcing organizational performance. The extant literature is clear that IT enables the optimization of business processes to create customer and firm value (Pagani & Pardo, 2017; Ramasamy, 2016; Verhoef et al., 2019), which is a key goal of digitalization.

However, while yielding useful insights, these studies were not undertaken in an SME-specific context, and there are significant differences between SMEs and larger firms. The policy challenge identified by the OECD (2017, p. 115) carries a clear assessment: “The ability of SMEs to swiftly adopt new technologies, to learn by doing, innovate, and optimize their production, is constrained by their small scale, limiting their ability to reap the benefits of the digital economy”.

These challenges notwithstanding, the growth of software-as-a-service affords SMEs cost-effective access to technology (Assante, Castro, Hamburg, & Martin, 2016) as well as the flexibility to switch between technologies as required, thereby avoiding sunk costs and lock-in to one IT provider (OECD, 2017). This presents SMEs with an unprecedented opportunity to develop a high-quality, scalable and adaptable IT infrastructure that can enable digitalization. We hypothesize:

Hypothesis 1: IT positively relates to the digitalization of SMEs.

## Skills

Having examined the literature on this resource, we extend beyond the topic of the employee’s skill in using individual technologies and applications to include the wider organizational dimensions referred to by Verhoef et al. (2019). These include continuous learning and the creation of teams with the right blend of skills as required by different digital projects. Nguyen, Newby, and Macaulay (2015, p. 211) identify organizational factors as one of four factors which constitute the “adoption environment” on which the success of IT implementation in SMEs depends. These organizational factors include a flexible organizational culture which is adaptive to change, an owner’s firm commitment to IT, employees’ knowledge and level of involvement in the implementation of IT, their ability to absorb and transform existing knowledge and generate new knowledge, effective teamwork, and knowledge sharing among different functions in the firm (Nguyen et al., 2015). The OECD (2016, p. 9) analysis concurs with the research by Nguyen et al. (2015), referring to the need to create the right environment in which firms can take full advantage of IT, including “cooperation across teams and stronger leadership”. In this regard, and as noted in the introduction, the smallness and flexibility of SMEs presents a number of strengths, including the ability of the owner and senior management to inculcate a shared identity which is more likely to encourage knowledge exchange among employees, especially during the growth stages of the venture (Bouncken & Barwinski, 2020; Fisher, Kotha, & Lahiri, 2016).

The development of this culture and skills is critical, not least because IT adoption, a central underpinning of digitalization, requires skilled employees to develop, adopt and integrate new and existing IT systems (Berman, 2012; Matt et al., 2015; Nguyen et al., 2015). Nylén and Holmström (2015) identify the promotion of continuous learning as integral to building digital capabilities. Innovation of new digital artefacts requires digital skills and the need to arrange teams with the corresponding digital skill set (Nylén & Holmström, 2015). Cloud computing, a transformative technology, allowing SMEs cost-effective access to technology, requires diverse skills in business, finance, project management, contract and vendor negotiation skills, and data integration skills (Assante et al., 2016). From a more general perspective, IT projects in SMEs often fail due to a lack of senior management support and poor project management skills (Nguyen et al., 2015).

With this in mind, we can begin to appreciate the challenge facing SMEs because the opportunities presented by unprecedented growth in technology can only be fully realized through the development of the requisite skills, increased innovation (Beliaeva et al., 2019) and organizational culture and structures. SMEs need a mix of hard skills, for example, the ability to use the technology and analyze higher volumes of data, as well as the soft skills, for example, solving poorly-structured problems, embracing change, ideation, and opportunity recognition (Beliaeva et al., 2019; Sousa & Rocha, 2019). Extant research shows that employees’ knowledge and skills, including critical thinking, problem solving capabilities, and the ability to collaborate in networks are all central to digitalization (Sousa & Rocha, 2019).

Employee skills are crucial to transforming a company’s IT landscape (Kane, Palmer, Phillips, Kiron, & Buckley, 2015, 2016; Sousa & Rocha, 2019). It can therefore be hypothesized:

Hypothesis 2: Employee skills positively relate to the digitalization of SMEs.

## Digital strategy

From a strategy perspective, recent findings show that organizations that digitally transform their business processes and organization structure have a clear and coherent digital strategy (Kane et al., 2015). A digital strategy goes beyond recognizing the pervasiveness of digital resources in functional areas such as operations, purchasing, and marketing (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013), but raises questions about business model reconfiguration (Bouncken et al., 2019; Clauss, Bouncken, Laudien, & Kraus, 2020) and innovation levels (Beliaeva et al., 2019). A digital strategy recognizes digital resources as a whole (Bharadwaj et al., 2013), creating and fulfilling expectations within the organization to acquire new resources (Fisher, Kotha, & Lahiri, 2016).

Bouncken and Barwinski (2020) find that a shared digital identity among organizational members can facilitate the development and expansion of digital technologies when shared by the same enthusiasm, values and beliefs. However, changing existing organizations based on a set of individual beliefs, norms and behavioral actions is a not a straightforward process and is replete with difficulties and resistance (Gioia, Patvardhan, Hamilton, & Corley, 2013). Thus, it is important for owner-managers to consider identity conflicts in their strategic priorities (Gioia et al., 2013; Miller, Le Breton-Miller, & Lester, 2011). Unmet expectations and inconsistent behavior that are at odds with a firm’s new transformative goals may result in identity conflicts among employees and form a barrier to a shared digital identity (Bouncken & Barwinski, 2020). Research has shown that identity considerations are especially important in family firms, as business identity and family identity are often activated together (Shepherd & Haynie, 2009).

While SME owner-managers rarely develop a formal strategy unless absolutely required to do so, findings indicate that businesses who are undergoing a change are more likely to follow a plan (Blackburn, Hart, & Wainwright, 2013). A digital strategy involves the transformation of products and services in combination with digital technologies taken from a business centric perspective (Matt et al., 2015; Teubner, 2013). This includes value creation, value capture mechanism, value proposition, digital technologies, key organizational shifts, and external and internal drivers (Bharadwaj et al., 2013; Grover & Kohli, 2013; Matt et al., 2015). Adoption of digital technologies permeates the wider organization, transcends existing traditional company borders, and requires a strategy to coordinate the entire transformation to reach the defined goal (Grover & Kohli, 2013; Matt et al., 2015). The creation of a new value proposition is often a key output of a digital strategy that requires four dimensions: 1) utilization of digital technologies, 2) transformation of value creation mechanisms, and 3) organizational changes, which in turn involve 4) financial planning (Gioia et al., 2013; Kane et al., 2015; Matt et al., 2015). Recent research asserts that firms require a digital strategy to orchestrate all mandatory resources to achieve and enhance competitiveness (Grover & Kohli, 2013; Yeow, Soh, & Hansen, 2018). On the other hand, the absence of a digital strategy leads to poor decisions and a waste of resources (Hess, Matt, Benlian, & Wiesböck, 2016). It can as a result be hypothesized:

Hypothesis 3: Digital strategy positively relates to the digitalization of SMEs.

## Digitalization and performance

The OECD (2017) is clear about the benefits of digitalization for SMEs: better access to skills and talent, greater access to markets, more extensive access to financing, better collaboration and communication, greater access to technology and applications, more extensive product development, and reductions in red tape. According to Verhoef et al. (2019, p. 3), “Through digitalization firms apply digital technologies to optimize existing business processes by allowing a more efficient coordination between processes, and/or by creating additional customer value through enhancing user experiences”. Bley, Leyh, and Schäffer (2016) show that the digitization of business processes increases efficiency and reduces costs. Research also shows that supplier-side and customer-side digitization (Barua, Konana, Whinston, & Yin, 2004), support of core competencies (Ravichandran & Lertwongsatien, 2014), and the adoption of e-procurement systems (Albano, Antellini, Castaldi, & Zampino, 2015) positively relate to financial performance. It can therefore be hypothesized:

Hypothesis 4: Digitalization positively relates to financial performance.

## Complementarity of resources

There is a paucity of research on the extent to which the complementary linkage of resources can lead to increased firm performance (Powell & Dent-Micallef, 1997; Teece, 2010). Hypotheses H1 to H4 propose that IT, employee skills, and digital strategy relate to digitalization, and digitalization positively relates to financial performance.

When it comes to linking SME resources, the literature indicates that IT improves business performance when it is combined with other resources (Neirotti & Raguseo, 2017). For example, Ravichandran and Lertwongsatien (2014) investigated complementary capabilities under the RBV such as human capital and IT partnership, showing that “complex bundles of IT-related resources, skills and knowledge, exercised through business processes, which enable firms to coordinate activities and make use of IT assets to provide desired results” (Dale Stoel & Muhanna, 2009, p. 189) generally increase sales performance. The degree to which IT capabilities and resources are distinctive depends on how well they are embedded within the firm and how SMEs innovate with new products and services (Neirotti & Pesce, 2018).

Moreover, employee skills are essential for building digitalization capabilities and resources. Complex IT system adoption (Nguyen et al., 2015), IT project management (Blackburn et al., 2013), or the development of new firm resources such as in-machine learning or innovation with Internet of Things (IoT) products are built on employee skills and the ability to transform existing business processes (Sousa & Rocha, 2019).

Finally, orchestrating digitalization is a difficult transformation with changing structures, replacement or complementation of existing processes, and new strategic goals (Hinings, Gegenhuber, & Greenwood, 2018). This reconfiguration creates potential digital affordances that affect existing structural elements, roles and relationships, as well as the identity of an organization and of individuals (Autio et al., 2018; Bouncken & Barwinski, 2020; Bouncken, Fredrich, & Kraus, 2020). A digital strategy describes pathways to transform resources within the value creation process and organizational structural changes (Bharadwaj et al., 2013; Matt et al., 2015). The effect of digitalization, based on a strategy, unfolds when new digitally-enabled products and services offered to customers fulfil changed or changing customer needs. It can therefore be assumed that the resources of digital strategy, IT, and employee skills mediated by digitalization lead to increased financial performance.

Hypothesis 5: The relationship between a) IT, b) employee skills, c) digital strategy, and financial performance is mediated by digitalization.

# Methodology

## Data collection and sample

We examined the hypotheses within a research context of SMEs (between 1 and 249 employees), collecting contact information from the Austrian Chamber of Commerce database as well as lists of destination marketing organizations in Tyrol, Austria. The quantitative data was collected via an online survey, which was reviewed by two university academics and pre-tested by six university members. Comments on questions, sentence structure, wording and consistency were considered for the final questionnaire to improve comprehensibility and validity. In February 2018, a link to the online survey was sent to 4,146 randomly selected SMEs by e-mail, resulting in 193 fully and correctly completed questionnaires. The overall response rate of 4.65% was similar to related studies in SME research (Kallmuenzer & Scholl-Grissemann, 2017). Table 1 shows the descriptive statistics of the data sample.

[Table 1 here]

Categorization of businesses unveiled that most of the participating firms employ less than ten employees, which is typical for the western Austrian region.

## Measures

*Independent variables:* The information technology variable (IT) was measured with the five-point Likert scale, ranging from 1 “strongly disagree” to 5 “strongly agree” as used by Kane et al. (2015). All items from the variable IT could be retained with factor loadings ranging from 0.739 to 0.803 (Field & Field, 2013). The employee skills variable (SKI) was measured with a 5-Point Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree”, adopted from Nylén and Holmström (2015), Aral and Weill (2007), and Kane et al. (2015). The digital strategy variable (DS) was measured with a five-point Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree” as adopted from Kane et al. (2015).

*Dependent variable:* SMEs are not obliged to publish financial data in most countries. Adopting the scale by Lumpkin and Dess (2001), the financial performance variable (FP) was measured with a five-point Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree.” This scale measures owner-managers’ perception regarding the financial performance of the respective SME.

*Mediating variable:* The mediating digitalization variable (DIG) refers to the assessment of the companies’ digitalization capability, and was measured with a 7-point Likert scale ranging from 1 “very low” to 7 “very high” as adopted from Bley et al. (2016). Likert scales with five or seven choices demonstrably do not produce any difference in the internal structure concerning mean, item-item, and item-total correlation (Leung, 2011).

*Control variable:* Financial performance may be influenced by other circumstances. Furthermore, control variables prevent measurement failures on the dependent variable (Creswell, 2014; Field & Field, 2013). Control variables such as the number of employees (SIZE) was adopted from Kellermanns et al. (2012). Family ownership (OWN) and company age (AGE) were adopted from Chrisman and Patel (2012).

We applied standard thresholds on Cronbach’s-α, composite reliability (CR), average variance extracted (AVE), and factor loadings using exploratory factor analysis (EFA) to meet validity and reliability standards. A factor loading above 0.6 (Field & Field, 2013), a Cronbach’s-α and CR above 0.7 (Hair, Black, Babin, & Anderson, 2014), and AVE above 0.5 (Hair et al., 2014) were applied. The EFA for the variable SKI led to the removal of items SKI4 (0.559), SKI6 (0.204), and SKI7 (0.223), showing factor loadings below 0.6 (Field & Field, 2013). The EFA of DS removed items DS1 (0.053) and DS2 (0.394) with factor loadings below 0.6 (Field & Field, 2013). All items of the variables DIG, IT, and FP could be retained. Table 2 shows the correlations between the variables.

[Table 2 here]

Table 3 shows the factor loadings, AVE, CR, and Cronbach-α on all variables.

[Table 3 here]

None of the variance inflation factors exceeded 1.786, indicating that multicollinearity was not a concern (Hair et al., 2014).

# Results

## Regression analysis

The data sample consisted of simultaneous self-reported data from the same informants to assess the independent and dependent variables and as such it could represent a potential source of common method bias (Podsakoff, MacKenzie, & Podsakoff, 2012). We conducted a Harman’s one-factor test where all items were subject to an EFA (Podsakoff et al., 2012). Common method variance was given if a single factor emerged from an unrotated factor solution or if the first factor explained more than 50% of the computed variance (Podsakoff et al., 2012). The analysis produced 17 factors above an eigenvalue of 1, explaining 96.86% of the total variance. The first factor explained 36.01% of the variance. No single factor emerged, so a common method variance was not a major issue.

A multiple hierarchical regression analysis (HRA) was conducted after the EFA and reliability test to test Hypotheses H1 to H4 with control variables OWN, SIZE, and AGE. DIG was seen as being significantly affected by IT (β=0.209, p=0.001, H1 supported), SKI (β=0.302, p=0.000, H2 supported), and DS (β=0.306, p=0.000, H3 supported). The direct effect of DIG on FP was tested with a multiple hierarchical regression analysis, with DIG positively relating to financial performance (β=0.148, p=0.042, H4 supported). The control variables OWN, SIZE, and AGE did not significantly affect the dependent variables at a 95% confidence interval. Table 4 shows the results of the HRA.

[Table 4 here]

## Mediation analysis

The fourth model by Hayes (2017) was used to measure the direct and indirect effect between the mediating variable DIG and the dependent variable FP, as well as the influence of the three independent variables IT, SKI, and DIG. For the direct and indirect effects, the bootstrapping resampling strategy was conducted with the PROCESS macro for IBM SPSS. The bootstrapping method used 10,000 iterations with a 95% bias-corrected confidence interval. Table 5 shows the results of the mediation analysis.

[Table 5 here]

In terms of the mediation path IT → DIG → FP, the findings showed that the mean indirect effect of the bootstrap analysis was negative and significant at the 10% significance level (a×b = -0.0619) where pa=0.0000 and for pb=0.0795, with a 95% confidence interval including zero (-0.1385 to 0.0007). In the indirect path, a unit increase in IT increased DIG by a=0.5797 units; holding IT constant, a unit increase in DIG decreased FP by b=-0.1067, significant at the 10% significance level (pb =0.0795) on a 0 to 1 scale. The direct effect (c’=0.7160) was significant (pc’=0.000); holding DIG constant, a unit increase in IT increased FP by 0.7160, reflecting fluency effects. Since a×b×c (0.6542) was positive, it is a complementary mediation effect (Zhao, Lynch, & Chen, 2010).

For the mediation path SKI → DIG → FP, findings showed the mean indirect effect from bootstrap analysis to be positive and not significant (a×b=0.0281) for pa=0.0000 and pb=0.6536, with a 95% confidence interval including zero (-0.1057 to 0.1460). In the indirect path, a unit increase in SKI increased DIG by a=0.7492 units; holding SKI constant, a unit increase in DIG had no effect on FP because it was not significant (pb=0.6536) on a 0 to 1 scale. The direct effect (c’=0.2657) was significant (pc’=0.0162); holding DIG constant, a unit increase in SKI increased FP by 0.2657 units, reflecting fluency effects. Since a×b×c (0.2938) was positive, it is a direct only and non-mediation effect.

Regarding the mediation path DS → DIG → FP, findings showed the mean indirect effect from bootstrap analysis as positive and not significant (a×b=0.0905) for pa=0.000 and for pb= 0.0137, with a 95% confidence interval including zero (-0.0229 to 0.2229). In the indirect path, a unit increase in DS increased DIG by a=0.7734 units; holding DS constant, a unit increase in DIG had no effect on FP because it was not significant pb = 0.137 on a 0 to 1 scale. The direct effect (c’=0.0837) was not significant (pc = 0.4681) and had no effect.

# Discussion

This study contributes to a better understanding of the antecedents, consequences and challenges of digitalization in SMEs, empirically examining the relationship between the three key SME resources of IT, employee skills, and digital strategy, and digitalization, as well as the impact of these resources and digitalization on financial performance. IT has a positive effect on digitalization (H1). This suggests that IT resources including mobile technologies (Singh & Swait, 2017), social media (Ainin et al., 2015; Wu, 2016), collaborative technologies, cloud computing services, and analytics tools contribute to the digitalization of SMEs. Extending this finding, Neirotti and Raguseo (2017) argue that externally oriented IT-based capabilities have a greater impact on performance than internal IT-based capabilities which focus on efficiency. The findings also confirm extant research (Ainin et al., 2015), which shows that digital analytical tools allow SMEs to measure insights and optimize existing business processes (Soroka et al., 2017; Wamba et al., 2017). Mobile technologies allow customer relationships to be developed and also offer new collaboration capabilities (Singh & Swait, 2017). Similarly, Wamba et al. (2017) found that digital analytical capabilities positively relate to firm performance.

Employee skills have a positive effect on digitalization (H2), which confirms the findings of comparatively recent studies indicating that digitalization depends on human capital as well as technological resources (Jandric & Randelovic, 2018; Sousa & Rocha, 2019; Sousa & Wilks, 2018). The adoption of new digital technologies often requires well-educated employees and the existing literature suggests that skilled employees are necessary for disruptive digitalization (Sousa & Rocha, 2019). Furthermore, and based on a shared enthusiasm and digital identity (Bouncken & Barwinski, 2020) those employees are central to rebuilding values, norms and organizational behavior during the transformation process (Fisher et al., 2016; Gioia et al., 2013).

Digital strategy has a positive effect on digitalization (H3), which is in line with prior research suggesting that SMEs undergoing a transformation process are more likely to follow a plan, albeit not a formal strategy (Blackburn et al., 2013). Digitalization affects the organization on different levels: First, the identity of the organization might change, with new norms and values that have to meet the expectations of the different audiences of the transformed venture (Fisher et al., 2016; Gioia et al., 2013); Second, digitalization challenges the current business model and value proposition and acts as a driver of further growth (Bouncken et al., 2019; Clauss et al., 2020; Fisher et al., 2016). Finally, digital innovations (Kraus et al., 2018), enhance the customer experience, lead to business improvements, and a positive transformation of the business model (Kraus et al., 2019). Digitalization also has a positive effect on the financial performance of SMEs (H4). Building new capabilities through digitalization, in a business environment characterized by rapid technological change, can be more important than strategizing. The ability to integrate, build, and reconfigure competencies encourages new forms of competitive advantage (Teece, 2019).

However, findings from the mediation analysis (H5a to H5c) present a more mixed picture. While digitalization positively mediates the effect of IT on financial performance on both direct and indirect paths (H5a), it does not positively mediate the impact of employee skills (H5b) and digital strategy (H5c) on financial performance. On first inspection these findings appear contradictory, however they make a valuable contribution to our understanding of SME digitalization as they reveal the difficulties for SMEs to transform existing resources into digitally enabled ones. It is instructive to reflect on what those difficulties might be. One might be internally conflicting identity issues at the individual and organizational level (Bouncken & Barwinski, 2020; Fisher et al., 2016). These issues can occur when employees do not subscribe to the same norms, standards and values (Fisher et al., 2016). A key challenge for managers therefore is to decide and plan the scope and level of business model digitalization (Bouncken et al., 2019). However, this highlights a second difficulty, namely a lack of management skills (Heikkilä, Bouwman, & Heikkilä, 2018; Kane et al., 2015) which has been shown to obstruct this process (Venugopal, Krishnan, Upadhyayula, & Kumar, 2020). This is more likely to be an SME-specific issue with SME owner-managers typically focusing on operational tasks and less on strategic planning (Heikkilä et al., 2018). This operational focus obscures organizational and portfolio decisions and needs to be reconsidered (Bouncken et al., 2019; Bouncken & Barwinski, 2020) and shifted towards developing new roles, skills and knowledge for future growth stages (Bouncken et al., 2019). In this endeavor, SMEs can build on their inherent flexibility and coherent culture, which generally positively influence organizational change (Bouncken & Barwinski, 2020; Shepherd & Haynie, 2009). Owner-managers with a positive identification with digital technologies can build a digital identity consisting of future norms, standards and values which in turn can be easily shared with employees, because of the small size and flexibility of a SME (Bouncken & Barwinski, 2020).

The transformation of a business model is difficult and requires investment and the necessary accompanying skills. Studies have found that even though owner-managers recognize the value of a strategy, daily business operations lead to them avoiding strategic planning activities (Heikkilä et al., 2018; Peters & Buhalis, 2004). The results suggest that digitalization supports specific core competencies, leading to an increased financial performance as a result (Ravichandran & Lertwongsatien, 2014). The challenge remains however for SMEs to recruit employees with the requisite skills; this will continue to be a significant barrier towards successful digitalization.

# Conclusion

This study contributes to our knowledge of SME digitalization and the resources that need to be configured for this transformation process to succeed. IT adoption, employee skills, and a digital strategy significantly drive digitalization, and, in turn, digitalization drives the financial performance of SMEs. IT is directly and indirectly identified as a key factor influencing financial performance via digitalization. Prior studies have found IT as positively relating to financial performance (Behera, Nayak, & Das, 2015; Nguyen et al., 2015), supporting our findings for the SME context. However, SME owner-managers can also obtain a competitive advantage through both adopting IT and building digital capabilities to enhance the effective deployment of IT (Mao, Liu, Zhang, & Deng, 2016).

Data processing technologies, cloud computing services, mobile technologies, and social media channels are appropriate digital technologies that extend, create, or modify existing products and services for SMEs, helping them reach a wider customer base (Assante et al., 2016). SME managers need to support and train employees to obtain the necessary digitalization skills (Sousa & Rocha, 2019). This will naturally change their existing roles and also affect the identities of employees and the identity of the organization as a whole (Bouncken & Barwinski, 2020). Managers need to support employees to develop accordingly (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2014) and to create an identity and role within the organization related to digitalization (Fredrich, Bouncken, & Kraus, 2019).

Managers additionally need to invest in digital technologies to meet future customer expectations such as digital services or products (Davis, Field, & Stavrulaki, 2015; Leipzig et al., 2017). SME managers will specifically need to develop a digital strategy with concrete key performance indicators and actions to monitor the transformation process. As the data suggests, digitalization does not support financial performance on every single level, so a detailed strategy and measurement plan will be useful in identifying undesirable developments. Such fundamental changes may cause identity issues for individuals (Bouncken et al., 2019; Bouncken & Barwinski, 2020) and occur when expectations of individuals imbalance with future norms, values and standards (Bouncken & Barwinski, 2020; Fisher et al., 2016). That said, managers need to carefully build a digital identity to establish future norms and values and to foster knowledge exchange between individuals (Bouncken & Barwinski, 2020).

This study has several limitations. First, data was collected in the western Austrian province of Tyrol and the regional focus may limit the generalizations of the findings. Repeating this study in other geographical regions would improve the reliability and validity of the measurement model. Second, SMEs are not obliged to publish financial data in most countries, such as Austria, so the financial performance measures of this study were based on self-reporting data. Research nevertheless indicates that self-reporting data does in fact correlate with objective performance measurements (Brush & Vanderwerf, 1992).

We have identified a number of research questions which can move the SME digitalization and digital transformation agenda forward. Firstly, how can a digital identity be created and fostered in SMEs, especially in family firms where multiple identities might exist (Shepherd & Haynie, 2009)? Secondly, how does a digital identity influence employees’ learning capabilities? Thirdly, and on a more technical note, future research could also develop a measurement scale for digitalization that is reflective of the nuanced practices within SMEs. Fourthly, and relatedly, additional studies might also investigate the performance outcome of different digitalization adoption scenarios. Fifthly, and a digital imperative given the growth in the number of applications and technologies available to SMEs, which digital technologies make the greatest contribution to financial performance? Finally, as this dynamic phenomenon becomes increasingly complex and heterogeneous, future research could investigate what employee skills are necessary for the digital transformation of SMEs.

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**Table 1**

Descriptive statistics.

|  |  |  |
| --- | --- | --- |
|   | Frequency  | Percentage  |
| Businesses |  |  |
| Micro-firms (< 10 employees) | 152  | 78.8%  |
| Small-sized firms (10 – 49 employees) | 35  | 18.1%  |
| Medium-sized firms (50 – 259 employees) | 6  | 3.1%  |
| Gender of respondents |  |  |
| Female | 108 | 55.9% |
| Male | 85 | 44.1% |
|  | Firm size (SIZE) | Firm age (AGE) |
| Mean (SD) | 8.86 employees (19.12) | 34.16 years (27.57) |

**Table 2**

Descriptive and construct correlations.

| Variable | Mean | SD | DIG | FP | SKI | IT | DS |
| --- | --- | --- | --- | --- | --- | --- | --- |
| DIG | 4.42 | 1.36 | 1.00 |  |  |  |  |
| FP | 4.46 | 1.20 | 0.148\* | 1.00 |  |  |  |
| SKI | 2.66 | 1.01 | 0.561\*\* | 0.244\*\* | 1.00 |  |  |
| IT | 3.20 | 1.03 | 0.444\*\* | 0.540\*\* | 0.423\*\* | 1.00 |  |
| DS | 3.26 | 0.92 | 0.542\*\* | 0.142 | 0.466\*\* | 0.368\*\* | 1.00 |
| Notes: \*\*p < 0.01, \*p < 0.05, n = 193 |

**Table 3**

Quality criteria of constructs.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Measures | EFA | α | CR | AVE |
|  | Digitalization (DIG) |  | 0.805 | 0.886 | 0.722 |
| DIG1 | Assessment of your own digitalization compared to the industry | 0.777 |  |  |  |
| DIG2 | Assessment of ICT use | 0.913 |  |  |  |
| DIG3 | Evaluate how extensive your own ICT use is | 0.854 |  |  |  |
|  | Employee Skills (SKI) |  | 0.859 | 0.877 | 0.643 |
| SKI1 | We promote continuous learning of the unique properties of digital technologies. | 0.913 |  |  |  |
| SKI2 | The balance between overall digital skills & specialized digital roles is adequate. | 0.841 |  |  |  |
| SKI3 | We can assemble teams with the right combination of skills for each digital project. | 0.719 |  |  |  |
| SKI5 | My organization provides the employees with the resources or opportunities to obtain the right skills to take advantage of digital trends. | 0.716 |  |  |  |
|  | Digital Strategy (DS)To what extent do you agree that the following are objectives of your organization’s digital strategy? |  | 0.879 | 0.913 | 0.677 |
| DS3 | Fundamentally transform business processes and/or business model (e.g., grow new lines of business) | 0.734 |  |  |  |
| DS4 | Improve customer experience and engagement | 0.755 |  |  |  |
| DS5 | Improve innovation | 0.838 |  |  |  |
| DS6 | Improve business decision making | 0.829 |  |  |  |
| DS7 | Increase efficiency (e.g., automation, timely access to expertise and communities) | 0.824 |  |  |  |
|  | Information Technology (IT)To what extent does your organization use the following digital technologies? |  | 0.782 | 0.860 | 0.606 |
| IT1 | Social Media and Collaborative Technologies | 0.769 |  |  |  |
| IT2 | Mobile Technologies | 0.739 |  |  |  |
| IT3 | Data and Analytics | 0.803 |  |  |  |
| IT4 | Cloud Computing Services | 0.800 |  |  |  |
|  | Financial Performance (FP) |  | 0.943 | 0.955 | 0.781 |
| FP1 | Sales growth | 0.775 |  |  |  |
| FP2 | Return on sales | 0.925 |  |  |  |
| FP3 | Gross profit | 0.887 |  |  |  |
| FP4 | Net profit | 0.921 |  |  |  |
| FP5 | Return on equity | 0.892 |  |  |  |
| FP6 | Return on investment | 0.894 |  |  |  |

**Table 4**

Results regression analysis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Model 1 | Model 2 | Model 3 | Model 4 |
| Dependent variable | Digitalization | Digitalization | Financial Performance | Financial Performance |
| Controls | β | β | β | β |
|  OWN | -0.057 | 0.012 | 0.032 | 0.074  |
|  SIZE | 0.028 | 0.010 | 0.001 | -0.058 |
|  AGE | 0.059 | 0.038 | 0.030 | 0.057 |
| Independent Variable |  |  |  |  |
|  Information Technology (IT) |  | 0.209\*\* |  | 0.551\*\* |
|  Employee Skills (SKI) |  | 0.302\*\* |  | 0.054 |
|  Digital Strategy (DS) |  | 0.306\*\* |  | -0.084 |
| R² | 0.009 | 0.406 | 0.002 | 0.295 |
| F | 0.582 | 22.183\*\* | 0.119 | 13.579\*\* |

Notes: \*\*p < 0.01, \*p < 0.05

**Table 5**

Results of mediation analysis.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hypothesis | Effects | Pathways | p | Coeff. | LLCI  | ULCI | R2 | F |
| H5a (IT→DIG→FP) | IT→DIG | (a) | 0.0000 | 0.5797 | 0.4052 | 0.7542 | 0.1960 | 11.276 |
|  | DIG→FP | (b) | 0.0795 | -0.1067 | -0.2262 | 0.0127 | 0.3143 | 16.868 |
|  | Direct Effect (IT→FP)  | (c’) | 0.0000 | 0.7160 | 0.5566 | 0.8755 | 0.3143 | 16.868 |
|  | Total Effect  | (c) | 0.0000 | 0.6542 | 0.5097 | 0.7986 | 0.3027 | 20.07 |
|  | Indirect Effect  | (a × b) |  | -0.0619  | -0.1385  | 0.0007  |  |  |
| H5b (SKI→DIG→FP) | SKI→DIG | (a) | 0.0000 | 0.7492 | 0.5818 | 0.9166 | 0.3360 | 20.364 |
|  | DIG→FP | (b) | 0.6536 | 0.0375 | -0.1272 | 0.2022 | 0.0696 | 2.393 |
|  | Direct Effect (SKI→FP) | (c’) | 0.0162 | 0.2657 | 0.0449 | 0.4816 | 0.0696 | 2.393 |
|  | Total Effect | (c) | 0.0013 | 0.2938 | 0.1171 | 0.4705 | 0.0684 | 2.955 |
|  | Indirect Effect  | (a × b) |  | 0.0281 | -0.1057 | 0.1460 |  |  |
| H5c (DS→DIG→FP) | DS→DIG | (a) | 0.0000 | 0.7734 | 0.5926 | 0.9542 | 0.2978 | 18.445 |
|  | DIG→FP | (b) | 0.1370 | 0.1170 | -0.0376 | 0.2715 | 0.0380 | 1.366 |
|  | Direct Effect (DS→FP) | (c’) | 0.4681 | 0.0817 | -0.1400 | 0.3033 | 0.0380 | 1.366 |
|  | Total Effect | (c) | 0.0715 | 0.1721 | -0.0152 | 0.3595 | 0.0256 | 1.142 |
|  | Indirect Effect | (a × b) |  | 0.0905  | -0.0229 | 0.2229 |  |  |

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