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Digital orientation, digital maturity, and digital intensity: determinants of financial success in digital transformation settings

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Abstract

Purpose – This study aims to investigate three relevant antecedents of digital transformation (digital orientation, digital intensity and digital maturity) and their influences on the financial success of companies.
Design/methodology/approach – Building on the strategic management and digital transformation literature, five hypotheses are developed to find the relationships between these antecedents and financial success.
Findings – Digital orientation and digital intensity alone do not contribute to the financial success of companies. Specifically, digital intensity serves as a negative moderator between digital orientation and financial success, meaning that it reduces the performance effects of digital orientation. Digital maturity acts as a mediator between digital orientation and the financial success of companies and between digital intensity and the financial success of companies.
Originality/value – This research contributes to the literature on strategic management and digital transformation by providing a further understanding of three relevant antecedents of digital transformation (digital orientation, digital intensity and digital maturity) and how they should be positioned alongside digital transformation settings to achieve financial success.

Keywords Digital transformation, Digital maturity, Digital intensity, Digital orientation, Financial success
Paper type Research paper

1. Introduction

The ubiquitous distribution of digital technologies and the rapid pace of digital transformation confirm that no industry is safe from the effects of digital transformation (Chen *et al.*, 2021; Hess *et al.*, 2016; Lanzolla *et al.*, 2018; Sousa-Zomer *et al.*, 2020; Vial, 2019). Thus, it is necessary to understand how quickly responses to changes encountered (due to digital technology) and the use of opportunities offered by digital transformation actualize financial success (Hess *et al.*, 2016; Matt *et al.*, 2015; Vial, 2019). As mentioned by many researchers, digital transformation is not limited to cutting-edge technologies (Hess *et al.*, 2016; Kane *et al.*, 2015), and companies cannot exploit the full potential of digital transformation with only a common process and occasional digital updates (De la Boutetière *et al.*, 2018; Libert *et al.*, 2016). Instead, digital transformation requires strategic and continuous efforts, comprising a comprehensive set of digital transformation settings (Anand *et al.*, 2009; Chanias *et al.*, 2019; Hess *et al.*, 2016; Kane *et al.*, 2017; Sia *et al.*, 2016; Wang and Bai, 2021). Thus, for companies to survive and create financial success from digital transformation, they need to use strategic approaches to determine the critical elements in

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digital transformation settings (Hess *et al.*, 2016; Saunila *et al.*, 2021a; Ukko *et al.*, 2019; Vial, 2019).

Previous literature on strategic approaches often refers to technology use, changes in value creation, structural changes and financial aspects as critical dimensions (Hess *et al.*, 2016; Matt *et al.*, 2015). Digital orientation, commitment and openness to using digital technology (Khin and Ho, 2019; Saunila *et al.*, 2021a) are necessary, as these create competitive value through new ways of doing business (Fitzgerald *et al.*, 2014; Singh *et al.*, 2020). This study follows Khin and Ho's (2019) definition of *digital orientation* as an indicator of a company's commitment and openness to applying digital technologies when adopting digital transformation initiatives. Furthermore, changes in value creation represent an influential factor in digital transformation strategies, reflecting the impact of different ways of creating value (Hess *et al.*, 2016; Matt *et al.*, 2015). These changes can manifest through operating efficiently in changing environments and managing a greater volume of digitalization areas (Westerman *et al.*, 2012). This is called *digital intensity*, which refers to companies' ability to operate efficiently and manage a greater volume of operations in changing environments (Westerman *et al.*, 2012), and it is an influential factor in digital transformation and can accelerate companies' digital maturity (Sousa-Zomer *et al.*, 2020; Warner and Wäger, 2019). Furthermore, due to the complexities of digital transformation, finding strategic options for its accomplishment that match company goals is challenging and requires continuous and procedural effort (Anand *et al.*, 2009; Chanias *et al.*, 2019; Hess *et al.*, 2016; Kane *et al.*, 2017; Sia *et al.*, 2016; Singh *et al.*, 2020). This is called *digital maturity*, which refers to a systematic way of ensuring the preparedness necessary to consistently adapt to continual digital transformation (Kane *et al.*, 2017) and enables structural changes over time. Digital maturity is critical in digital transformation strategies because procedural effort governs their development, implementation and evolution (Chanias *et al.*, 2019; Matt *et al.*, 2015).

Despite the acknowledged potential of digital transformation, companies' numerous failures in achieving financial success via this phenomenon indicate a need for improved knowledge and understanding of digital transformation to reap any financial benefits (i.e. net profit and operating profit) (Loonam *et al.*, 2018; Matt *et al.*, 2015; Sousa-Zomer *et al.*, 2020; Vial, 2019). Moreover, there is a lack of knowledge regarding which strategic options can provide financial success for companies engaging in digital transformation (Hess *et al.*, 2016; Singh *et al.*, 2020). Thus, this study builds on strategic management and digital transformation to provide guidelines for finding antecedents of digital transformation and ways of utilizing these elements to attain financial success. The findings identify three relevant antecedents of digital transformation (digital orientation, digital intensity and digital maturity) and address the question of how companies should adopt these elements together to attain financial success (Hess *et al.*, 2016; Matt *et al.*, 2015). Digital transformation is influenced by many factors and can be studied from various perspectives. For example, Nadkarni and Prügl (2021) studied digital transformation from two perspectives: the adoption of disruptive digital technologies and actor-guided organizational transformation of capabilities, structures, processes and business model components. To justify the approach chosen for this study, we argue that so far, the interactions between digital orientation, digital intensity and digital maturity have been studied bilaterally, although many studies have suggested that these three antecedents to digital transformation need to be studied simultaneously (Kane *et al.*, 2017; Warner and Wäger, 2019). Furthermore, digital transformation can be studied at the personal, organizational and societal levels (Nadkarni and Prügl, 2021). The target of this study was large companies because they are more likely to have sufficient resources to achieve digital transformation. Therefore, the scope of our study encompasses only digital transformation at the organizational level.

This research contributes to the research on strategic management and digital transformation by providing a deeper understanding of the joint implications of these

elements and how they should be integrated into digital transformation settings to achieve financial success. The research question is as follows: How do the three relevant antecedents to digital transformation, namely digital orientation, digital intensity and digital maturity, influence companies' financial success? This study contributes to the theory on strategic digital transformation and practices by clarifying large companies' avenues to financial success via digital orientation, digital intensity and digital maturity. An organizational-level analysis of large companies with high revenue in Finland indicates that, although digital orientation and intensity are critical in digital transformation, they cannot provide financial success for large companies directly. Instead, they should be coupled with digital maturity to facilitate successful outcomes. Additionally, irrespective of the importance of digital intensity in this transformation, the results indicate that it minimizes the contribution of digital orientation.

The structure of this research begins with an introduction, which provides an overview of and details interest in the studied topic. Subsequently, the theoretical framework and research model are presented, and the hypothesis is developed. This considers the link between digital transformation and financial success, including mediating and moderating effects. The subsequent section explains the methodology, including the processes employed when selecting samples, collecting data and operationalizing the variables. Finally, the results and analyses are presented to demonstrate the model assessment and regression analysis, followed by the discussion and conclusion.

2. Theoretical framework and research model

2.1 Digital transformation

Despite the opportunities offered by digital transformation, many companies struggle to achieve the desired results (Frank *et al.*, 2019; Lanzolla *et al.*, 2018; Libert *et al.*, 2016; Sebastian *et al.*, 2017). Although thriving digital transformation initiatives can yield financial success (Dalenogare *et al.*, 2018; Hess *et al.*, 2016; Nasiri *et al.*, 2020b; Vial, 2019), the large number of failures indicate a lack of understanding (Loonam *et al.*, 2018; Matt *et al.*, 2015; Sousa-Zomer *et al.*, 2020; Vial, 2019). Digital transformation is a complex phenomenon that differs from previous transformations (Hess *et al.*, 2016; Sousa-Zomer *et al.*, 2020) because, in the unpredictable digital economy, it is nearly impossible to identify the path and destination of digital transformation from the beginning (Li, 2020). Furthermore, regardless of the uncertainties and high risks, business leaders must act quickly to address unexpected changes (e.g. technology development); if they wait for a point of deep crisis, their companies may never recover (Li, 2020). Thus, the full benefits of digital transformation cannot be achieved through merely occasional digital upgrades and changes in common processes (De la Boutetière *et al.*, 2018; Libert *et al.*, 2016). Furthermore, in the highly volatile digital economy, the traditional linear process of developing a strategy and then executing it is increasingly replaced by an iterative process in which strategy is developed and recalibrated through execution (Li, 2020). The linear approach is rooted in a stable environment, predefined path and standard results, which are not appropriate in digital transformation involving significant uncertainty and high-risk environments. In the face of rapid changes and frequent, simultaneous shifts in both destination and path, companies must follow iterative processes and renew strategic plans regularly and continuously (Li, 2020). Further, settings involving comprehensive amounts of digital transformation require continuous efforts (Anand *et al.*, 2009; Kane *et al.*, 2017; Sia *et al.*, 2016). Within this digital transformation setting, digital orientation is one element that reflects a company's openness and commitment to utilizing digital technology (Khin and Ho, 2019; Saunila *et al.*, 2021a). Digital orientation is a branch of technology orientation reflecting how firms can reap the benefits of the opportunities provided by advanced digital technology through understanding and

commitments to use emerging digital technologies (Arias-Pérez and Vélez-Jaramillo, 2022; Khin and Ho, 2019; Quinton *et al.*, 2018).

Kindermann *et al.* (2021) emphasized the need for orientation in digital transformation, noting that it helps to provide strategic guidelines for selecting, developing and implementing successful initiatives. According to their research, digital orientation at an organizational level encompasses four dimensions: the scope of digital technology, digital capabilities, digital ecosystem coordination and digital architecture configuration. These dimensions are related to financial success (Kindermann *et al.*, 2021). Given the importance of identifying the interconnections among dimensions and related constructs (MacKenzie *et al.*, 2011), as well as the knowledge that the utilization and consequences of digital transformation rely heavily on both the individuals and organizations that utilize a technology and technology itself, digital ecosystem coordination and digital architecture configuration are more relevant in digital product and digital services architecture (Kindermann *et al.*, 2021). Because this study focuses on companies' internal commitment to utilize advanced digital technologies rather than individual product and services development across organizational boundaries, the digital orientation in this study was chosen from the scope of digital technology dimension. Thus, this study builds on the definition provided by Khin and Ho (2019), who state that digital orientation is an indicator of a company's commitment and openness to the application of digital technologies when adopting digital transformation initiatives.

In addition to orientation, digital intensity is another important element in digital transformation because it can help companies achieve digital maturity. Digital intensity refers to the number of areas managed via digital solutions, transformation techniques or strategies. In other words, a firm's digital intensity is proportional to the firm's number of digital activities. Through implementing technology-based changes, digital intensity enables companies to operate efficiently and manage a greater volume of operations in changing environments (Westerman *et al.*, 2012). According to Sousa-Zomer *et al.* (2020), digital intensity is an influential factor in digital transformation, which is associated with company performance. Further, it can be considered a prerequisite for tackling challenges and for developing useful strategies in digital transformation. Accordingly, by enabling the acquisition of digital partners and (ultimately) successful operations within digital ecosystems, digital intensity can support advanced digital maturity and help companies with different assets reap the benefits of digital transformation (Warner and Wäger, 2019).

Digital maturity is not the simple implementation of new technology to support company strategies, staff members, culture, technology or structures to satisfy the needs of end users, employees or stakeholders. It also cannot be achieved via fast actions or by accident. Rather, digital maturity is attained through the uninterrupted process of adaption to a transforming digital landscape (Kane *et al.*, 2017). In their model for digital maturity in procurement and supply chains, Seyedghorban *et al.* (2020) noted that the achievement of digital maturity begins with digitization (i.e. converting analog entities to digital formats), digitalization (i.e. data-driven technologies) and digital integration (i.e. fully integrated and boundary less functions). Digitalization and implementation of digital technologies are requirements for digital integration, which includes advanced changes in companies' operations, both internal and external in scale and scope. According to Westerman *et al.* (2012), there are four levels of digital maturity: beginners, fashionistas, conservatives and digirati. Beginners are companies with low levels of digital tool use and significant competencies in traditional applications, such as enterprise resource planning (ERP). Fashionistas are companies that utilize high levels of digital tools, but lack the knowledge needed to improve business advantages. Conservatives, while familiar with the transformative vision, doubt the value of digital transformation. Finally, digirati know how to create value in digital transformation by combining transformative vistas with sufficient strategic investment in new opportunities. Companies with high levels of digital maturity combine digital activities with powerful

leadership to convert technology into transformation, ultimately achieving financial success (Westerman *et al.*, 2012). Thus, in this study, we consider digital maturity to be a systematic way of being ready to consistently adapt to continual digital transformation (Kane *et al.*, 2017).

Given the complexity of digital transformation, companies must implement a varied set of strategies, resources and operational routines and practices to obtain successful outcomes. Furthermore, digital technologies, resources and strategies are crucial for achieving financial success in digital transformation (Hess *et al.*, 2016; Vial, 2019; Wang and Bai, 2021). The present study examines digital orientation, digital intensity and digital maturity as antecedents of digital transformation due to the critical roles these elements play in the achievement of financial success. Digital orientation is an antecedent of digital transformation because it focuses on the use of digital technologies, which support firms from a technological perspective, and on digital transformation itself, as this occurs through digital technology (Hess *et al.*, 2016; Nasiri *et al.*, 2020c). Digital intensity is another antecedent of digital transformation that focuses on the development of useful strategies for choosing or eliminating digital solutions or operations (Dattée *et al.*, 2018; Nambisan *et al.*, 2017; Westerman *et al.*, 2012). Digital maturity is the final antecedent of digital transformation because of its focus on an iterative approach and continuous progress, both of which are critical in digital transformation (Li, 2020).

2.2 Research model

Although the above-mentioned literature has discussed, to some extent, the research background and the antecedents of digital transformation (Annarelli *et al.*, 2021; Kane *et al.*, 2017; Kindermann *et al.*, 2021; Sousa-Zomer *et al.*, 2020), previous research has not yet reached a consensus concerning how to achieve financial success in terms of both net profit and operating profit through these antecedents in practice (Table 1). There is a lack of research examining how to achieve financial success via the three identified antecedents of digital transformation or the relationships among the various antecedents of digital transformation (i.e. digital orientation, digital intensity and digital maturity). Thus, examining each antecedent of digital transformation in relation to the others and investigating how each setting supports financial success is necessary. The research model presented in the current study was developed to address this gap.

As noted previously, in this study, we examine the three relevant antecedents of digital transformation (digital orientation, digital intensity and digital maturity) and quantify their influence on the financial success of companies. Figure 1 depicts the developed research model, which consists of both mediating and moderating effects in different settings. The first setting includes the mediating effect of digital maturity between two important elements of digital transformation: digital orientation and digital intensity. The next setting encompasses the moderating effect of digital intensity between digital orientation and financial success, which includes both operating profit and net profit.

3. Hypothesis development

3.1 Connecting digital transformation with financial success

In recent years, most companies have adopted similar views concerning the high potential of digital transformation for achieving success (Hess *et al.*, 2016; Vial, 2019; Wang and Bai, 2021). Furthermore, numerous researchers have confirmed that digital technologies can pave the way to functional changes, which lead to operational and financial benefits, cost efficiencies and competitive advantages for companies through monitoring and optimization (e.g. Koh *et al.*, 2019; Martinez *et al.*, 2019; Porter and Heppelmann, 2014; Rubbio *et al.*, 2019;

Table 1. Summary of prior literature

	Contribution to success of companies	References	Implications from the perspective of the current study
Digital orientation	- Paves the way toward functional changes - Improves existing operational strategies - Provides strategic direction - Mitigates operational difficulties - Mitigates loss of concentrated scope - Reduces operational difficulties - Results in operational and financial benefits - Enhances cost efficiencies - Poses competitive advantages	Porter and Heppelmann (2014), Matt *et al.* (2015), Hess *et al.* (2016), Libert *et al.* (2016), Koh *et al.* (2019), Martinez *et al.* (2019), Rubbio *et al.* (2019), Tortorella *et al.* (2019), Vial (2019), Singh *et al.* (2020), Kindermann *et al.* (2021), Arias-Pérez and Vélez-Jaramillo (2022)	Digital orientation has the potential to contribute to companies' financial success, but the direct influence of digital orientation on companies' financial success has not yet been investigated. → *H1*
Digital intensity	- Assists in exploiting opportunities and preventing threats caused by digital technologies - Reaps the benefits of a strong vision when aligning digital investments with a common direction - Alleviates decision-making difficulties regarding the scale and scope of operations - Promotes engagement in more areas of digital transformation within companies' current capacities	Westerman *et al.* (2012), Nambisan *et al.* (2017), Singh and Hess (2017), Dattée *et al.* (2018), Warner and Wäger (2019)	Digital intensity has the potential to contribute to companies' financial success, but the direct influence of digital intensity on companies' financial success has not yet been investigated. → *H2*
	- Assists in the development of a clear vision and control over the selection of the domain within which a company wants to cover digital technologies - Assists is reducing the complex nature and the need to be selective about the scope of digital technologies used - Helps to manage the number of engaged actors and complexity	Westerman *et al.* (2012), Matt *et al.* (2015), Hess *et al.* (2016), Nambisan *et al.* (2017), Dattée *et al.* (2018), Vial (2019)	Digital intensity has the potential to facilitate digital transformation, but its moderating effect on the relationship between digital orientation and financial success has not yet been investigated. → *H5*
Digital maturity	- Assists in the development of a clear vision and effective governance, which facilitates the targeting of digital investments in accordance with company objectives - Increases the effectiveness of commitments to the use of and the utilization of digital technologies - Mediates the relationship between capabilities to utilize technology and innovation cases to examine the effects of digital transformation - Enhances the effects of Industry 4.0 technologies	Westerman *et al.* (2012), Kane *et al.* (2017), Arkhipova and Vaia (2018), Fettermann *et al.* (2018), Khin and Ho (2019), Gurumurthy *et al.* (2020)	Digital maturity level has the potential to facilitate digital transformation, but its mediating effect on the relationships between digital orientation and financial success, as well as digital intensity and financial success, has not yet been investigated. → *H3 and H4*

Tortorella *et al.*, 2019). However, the high level of failure in digital investments signals a low level of understanding about turning digital transformation into profitable outcomes (Libert *et al.*, 2016; Matt *et al.*, 2015; Vial, 2019). According to Libert *et al.* (2016), the effects of digital transformation on traditional key performance indicators cannot always be determined, rendering the consideration of intermediate indicators useful. For instance, the success of Apple can be measured by intermediate indicators, such as the profits from the number of generated apps and the degree of customer satisfaction when they are used. Furthermore, most of the benefits of digital transformation reside in a new way of operating, particularly in customer interactions or new ways of creating value through digital networks (e.g. Uber and Airbnb) (Vial, 2019). Further, many companies utilize digital technologies as to improve existing operational strategies, meaning they cannot reap the full benefits of digital transformation (Libert *et al.*, 2016). However, the number of different actors involved in digital transformation and the difficulties in engaging them across a wide domain cause complexity in value networks. Hence, attaining financial success in digital transformation is challenging and requires conscious effort (Matt *et al.*, 2015; Vial, 2019). This effort can manifest through digital orientation via the provision of strategic direction (Kindermann *et al.*, 2021) in a way that mitigates operational difficulties and any loss of concentrated scope (Hess *et al.*, 2016; Matt *et al.*, 2015; Singh *et al.*, 2020). Digital orientation can mitigate operational difficulties because a digital orientation within a commitment to use digital technology enables firms to implement differentiated digital solutions swiftly or add new digital entities to existing solutions (Arias-Pérez and Vélez-Jaramillo, 2022; Vial, 2019), thereby achieving financial success. Furthermore, digital orientation is critical in reducing operational difficulties, yielding financial success through monitoring, optimization and autonomy (Porter and Heppelmann, 2014), and creating value within digital technologies (Arias-Pérez and Vélez-Jaramillo, 2022). Thus, digital orientation through the provision of strategic direction for companies that adopt digital transformation is linked to financial success (Kindermann *et al.*, 2021; Hess *et al.*, 2016; Matt *et al.*, 2015; Wang and Bai, 2021). Therefore, the first hypothesis is as follows:

H1. Digital orientation affects financial success.

A large body of research has confirmed that digital transformation is not limited to single functional thinking (Berman, 2012; Hess *et al.*, 2016; Singh and Hess, 2017; Vial, 2019). In contrast, digital transformation in companies is concerned with "comprehensiveness of action," which is necessary to exploit opportunities and prevent threats caused by digital technologies (Singh and Hess, 2017; Warner and Wäger, 2019). When considering the different areas of company operations within digital initiatives, digital intensity is associated with financial success (Mithas *et al.*, 2012; Westerman *et al.*, 2012). According to Westerman *et al.* (2012), companies digitize their operations wisely (compared to those who cover all digital functions) are more successful in terms of net profit. This is because these

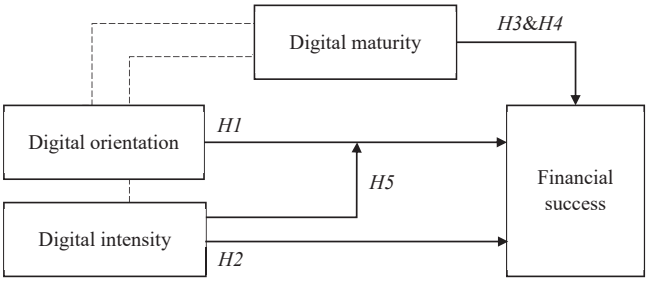

Figure 1.
Research model and hypotheses

companies can reap the benefits of a strong vision when aligning their digital investment with a common direction (i.e. financial success). Moreover, dynamic control over the creation of a digital economy can help companies be successful in their digital transformation. For instance, Apple's clear vision and concentration on its upcoming iPhone, iPod and iTunes-centric music platform yielded a more effective understanding of how platforms can be employed to create financial success (Dattée *et al.*, 2018). Thus, making decisions about the scale and scope of operations within or withdrawal from digital operations remains a difficult strategic choice for companies, as both options could cause challenges and unintended consequences (Dattée *et al.*, 2018; Nambisan *et al.*, 2017). Thus, the next hypothesis is as follows:

H2. Digital intensity affects financial success.

3.2 The mediating effect of digital maturity

Companies that possess a digital orientation tend to be more open and committed to using digital technologies (Khin and Ho, 2019; Saunila *et al.*, 2021a). Moreover, companies use different digital initiatives to facilitate their business objectives (Kane *et al.*, 2017). Such initiatives can be indicative of high digital intensity, as these implementations may relate to various operations throughout a company. Digital intensity also reflects a company's capability to engage in more areas of digital transformation within their current capacity (Westerman *et al.*, 2012). However, Kane *et al.* (2017) suggested that being digitally mature requires more than just implementing novel technologies for the purpose of transforming strategies, employees, organizational structures or culture for the benefit of stakeholders. Rather, it is a systematic adjustment to sustained digital change. Further, a company's digital maturity may affect its financial success, as these companies usually have a clear vision and effective governance, which assist in targeting digital investments in accordance with company objectives (Westerman *et al.*, 2012). According to a report by Deloitte, one of the leading firms in digital transformation, companies that commit to digital technology and utilize digital technologies can increase revenue by 15% at the starting point, and this growth in revenue will increase by three-fold (45%) when a digital maturity level is reached (Gurumurthy *et al.*, 2020).

The role of digital maturity in facilitating digital transformation has been studied from various perspectives. For example, Arkhipova and Vaia (2018) studied the role of information technology capabilities when acquiring innovation in third-party collaborations. Further, they discovered support for the mediating effect of digital maturity on that relationship. Khin and Ho (2019) found that companies engaged with the use of digital technologies and in developing their capability to manage such technologies are more likely to possess digital innovation, which can improve performance. Thus, orientation towards digital technologies and active engagement in their use (i.e. digital maturity) determine the ensuing impact. Fettermann *et al.* (2018) analyzed several Industry 4.0 cases to examine the effects of digital transformation in companies and revealed that the effects of these technologies can be significantly increased, as the maturity levels of successful cases were low. This indicates that the effects of these technologies increase in parallel with the level of digital maturity. Similarly, Kane *et al.* (2017) found that people working in companies with low digital maturity believe that their companies talk about digital transformation without actually implementing any strategies. Moreover, even companies that are highly oriented towards digitalization may not have yet reached a high digital maturity (given that high digital maturity is indicative of purposeful and systematic digital transformation). Thus, digital maturity is likely to further encourage different types of digital initiatives for the purpose of organizational success. Therefore, we propose the following hypotheses:

H3. Digital maturity facilitates the relation between digital orientation and financial success.

H4. Digital maturity facilitates the relation between digital intensity and financial success.

3.3 The moderating effect of digital intensity

Although digital transformation refers to the integration of digital technologies in different areas of business (Hess *et al.*, 2016; Matt *et al.*, 2015), it is not sufficient simply to be committed and open to using new technologies (digital orientation) if the aim is to reach the full potential of digital transformation for the sake of financial success (Hess *et al.*, 2016; Kane *et al.*, 2017; Matt *et al.*, 2015; Vial, 2019). Sousa-Zomer *et al.* (2020) referred to digital intensity as one of the digital transformation capabilities that can indirectly foster financial success; however, despite the importance of this element (Sousa-Zomer *et al.*, 2020), it is also necessary to have a clear vision and control over selecting the domain within which a company wants to cover digital technologies (Dattée *et al.*, 2018; Nambisan *et al.*, 2017; Westerman *et al.*, 2012). When companies have a sufficiently high digital intensity to cover vast numbers of digital operations, the number of engaged actors and complexity increases accordingly (Hess *et al.*, 2016; Vial, 2019). Thus, on one hand, a greater number of actors makes it difficult for companies to achieve digital orientation in a way that fully commits to and utilizes digital technology, and on the other, it increases the difficulties of achieving both operating and net profits. Therefore, considering the effects of digital intensity in the relationship between digital orientation and financial success is both relevant and critical. According to Matt *et al.* (2015), companies must also have a clear vision of the use of digital technologies to decide whether they want to be market leaders or to use established technologies as tools to satisfy their business operations. Despite all the competitive advantages afforded to technological market leader, there is always a risk of market losses and a lack of access to technological proficiencies. They also highlight the complex nature of digital transformation and the need to be selective about the scope of using digital technologies, since reducing scope might cause unwanted results and operational challenges (Matt *et al.*, 2015). Therefore, digital intensity without control and a clear vision of the digital transformation domain is likely to impact the benefits of digital orientation when aiming to achieve financial success. Thus, the next hypothesis is formed as follows:

H5. Digital intensity strengthens the relation between digital orientation and financial success.

4. Methodology

4.1 Sample selection and data collection

A sample of large companies was drawn from a variety of sectors to test the presented research model. Large companies were selected because these are more likely to have sufficient resources to achieve digital transformation. Previous studies have concluded that such companies do not always actively drive such transformations, suggesting that further research is needed on the mechanisms through which large companies succeed in digital transformation.

The data were collected from multiple sources: specifically, annual reports and financial statements of the selected companies. The final sample was chosen based on three phases. First, we used purposive sampling to select 500 of the largest Finnish companies to examine their digital transformation. Data on the 500 largest companies was drawn from the Talouselämä 500 list, which is an annual survey conducted by Talouselämä of the 500 largest companies in Finland by revenue, according to the companies' financial statements. This list was selected for sampling because it is

considered to have high quality content and coverage. Moreover, we only gathered data on large public companies because they were more likely to have publicly available financial statements, which we used to measure financial success. These companies were also likely to provide sufficient information on their digital transformations in their annual reports, allowing us to collect the required data and perform the analyses. Companies with missing information (i.e. old annual reports or incomplete financial measures) were then removed from the sample. Of the selected 500 companies, 169 did not publish annual reports in the focal year, meaning that the necessary information about the study topic was not available. These 169 companies were excluded, and 331 companies remained in the sample at the end of this phase.

Second, once the annual reports were collected, a content analysis of the reports was executed to identify the companies with measures related to digital transformation. We accomplished this by searching for keywords related to digitalization (we included "digit*" in the search box to track all possible variations of digitalization-related keywords). With this search, we wanted to ensure that the selected companies mentioned factors related to measures of digital transformation in their annual reports and were applicable to the study. This restriction was selected because it was considered an initiative for approaching digital transformation. Thus, manual sorting was conducted to ensure that the selected companies were implementing digital transformation in their operations. For example, one company implementing digital transformation stated the following in its annual report: "Digitalization is changing customer behavior, and customers are waiting for availability and service almost around the clock, on multiple devices and across multiple channels. [Company name] stores and digital channels offer expert service through a comprehensive service network-stores, pick-up points, e-commerce and a mobile application." At this point in the research, the keyword search was utilized only to assess whether companies should be included in the sample or not. The formulation of study variables was conducted separately, and that process is justified in the next section of the paper.

Third, information regarding the financial success of these companies (n = 331) was collected from official financial statements. Data for the dependent variable were collected for the year 2019 (as with the independent variables), since the initiatives implementing digital transformation was likely to be executed prior to their communication in annual reports. Accordingly, any effects were likely to emerge later in performance measures. Of the remaining 331 companies, 47 had incomplete financial information (meaning that official financial statements were not published for that year). These were excluded from the sample. Following these procedures, 284 companies remained in the final sample.

4.2 Operationalization of the variables

To summarize the key terminology, companies with a digital orientation tend to be more open and committed to using digital technologies (Khin and Ho, 2019; Saunila *et al.*, 2021a). In addition, performing digital transformation may also demand digital intensity, which enables companies to operate efficiently in changing environments and manage a greater volume of digitalization areas (Westerman *et al.*, 2012), and digital maturity, which is a systematic way of being ready to consistently adapt to continual digital transformation (Kane *et al.*, 2017). Thus, we used the operationalization of digital orientation, digital intensity and digital maturity to explain the influence of digital transformation on financial success. The reasoning behind these measures are described in the following section and summarized in Table 2.

4.2.1 Digital orientation. Digital orientation usually refers to a company's level of openness and commitment when using digital technologies, tools or measures. Thus, the annual reports of the companies in the selected sample were investigated using a keyword search to identify their level of digital orientation. Companies are required to provide accurate and timely information in their annual reports; thus, the information drawn from these reports can be

Variable	Source	Operationalization	Scale
Digital orientation	Annual reports	Number of mentions of digital related keywords in the annual reports (measured for 2019)	Nominal
Digital intensity	Annual reports	Number of digital transformation areas (strategy, leadership, organization and culture, customers, products and services, technology, production and processes, supply chain and employees) covered in the annual reports (measured for 2019)	Scale from 1 to 9
Digital maturity	Annual reports	Level of digital transformation maturity based on content analysis of the initiatives described in annual reports (measured for 2019)	Scale from 1 to 4
Net profit	Financial statements	Directly extracted from the database (measured for 2019)	Continuous
Operating profit	Financial statements	Directly extracted from the database (measured for 2019)	Continuous

Table 2. Operationalization of the variables

considered valid and reliable. In the analysis, a range of keywords related to digitalization were searched, yielding a nominal scale in which the operationalization of the variable was made using the number of mentions of digitalization-related keywords in the annual report. We included "digit*" in the search box to track all possible variations of digitalization-related keywords. The keyword search identified 76 different keywords. These included, for example, "Digital transformation," "Digital technologies," "Digitalization," "Digitalize," "Digital offering," "Digital platform," "Digital channel," "Digital services," "Digital solution," "Digital manufacturing, "Digital tools," "Digital processes," and "Digital strategy." A full list of identified keywords is available upon request. We built this measure based on the common notion in corporate reporting content analysis studies that the amount of the disclosure determines the disclosure's relative significance (Unerman, 2000). Thus, while we examined the number of the mentions related to digital initiatives, we also manually examined the annual reports to ensure that the companies in the sample were implementing digital initiatives and that, therefore, the variable was a true representation of digital orientation.

4.2.2 Digital intensity. Digital intensity refers to the breadth of areas connected to digital transformation within a company's operation. Previous studies have concluded that digital organizations may utilize digital technologies in nine areas: strategy (Bharadwaj *et al.*, 2013; Saunila *et al.*, 2021b; Ukko *et al.*, 2019), leadership (Berman, 2012; El Sawy *et al.*, 2016), organization and culture (Vial, 2019), customers (Westerman *et al.*, 2012), products and services (Nasiri *et al.*, 2020a; Setia *et al.*, 2013), technology (Hinings *et al.*, 2018; Yoo *et al.*, 2012), production and processes (Dalenogare *et al.*, 2018; Frank *et al.*, 2019), supply chain (Büyüközkan and Göçer, 2018; Nasiri *et al.*, 2020c) and employees (Hess *et al.*, 2016; Vial, 2019). Thus, the annual reports of the companies in the selected sample were analyzed using content analysis to identify whether the companies had implemented digital initiatives in various operations throughout the company. We searched for a wide range of keywords related to digitalization, as we included "digit*" in the search box to track all possible variations of digitalization-related keywords. As we were interested in digital initiatives related to strategy, leadership, organization and culture, customers, products and services, technology, production and processes, supply chain, and employees, we searched for digitalization-related keywords related to each area and extracted the accompanying texts to measure digital intensity for each company in the sample. Thus, we explored these nine areas in the annual reports and spotted digitalization-related keywords therein. Next, we executed a content analysis of the extracted text to identify the scope of digital initiatives and classified companies according to the number of areas adopted. Thus, the analysis was guided by the

nine predefined areas. The digital intensity measure for each company was decided through an iterative process that included the following stages: (1) reading the extracted text, interpreting the contents and writing notes; (2) coding and classifying the companies into initial categories; (3) cross-analyzing each company in relation to other companies in the same category and (4) selecting the final digital intensity levels for each company. The repetition of this process resulted in a stage in which no new information from the data was found, after which the final measure for digital intensity was developed. Thus, the research validity was strengthened through replication. This resulted in the operationalization of a scale from one to nine depending on how many of the nine areas companies developed via digital initiatives. Here, the variable was constructed based on the variety of operations in which digital initiatives were implemented. As companies are required to offer timely information in their annual reports, we believe that the information is complete.

4.2.3 Digital maturity. Digital maturity transcends the introduction of novel technologies via the adaptation of company operations to meet the expectations of all stakeholders. Rather, digital maturity is an ongoing process of adjusting to a transforming digital environment (Kane *et al.*, 2017). Content analysis was performed to understand the companies' ongoing actions to manage digital transformation in greater depth, as this type of analysis offers an objective and systematic means for studying the content of communications (Berelson, 1952). Accordingly, when collecting data from the annual reports, we gathered data for operationalizing digital maturity by searching for a range of digitalization-related keywords, including "digit*" in the search box to track all possible variations of digitalization-related keywords. The texts identified based on the keyword search were analyzed both word-by-word and in context by reviewing neighboring text. The texts neighboring the identified digitalization-related keywords were extracted and then iteratively coded to filter out and collect meaningful content; that is, we identified the main mechanisms and progress of digital initiatives from each text. Unlike with the measure of digital intensity presented in the previous section, digital maturity coding did not aim to reveal the scope (breadth) of digital initiatives; rather, it aimed to understand the depth of the companies' initiatives towards digital transformation. Thus, we systematically extracted and annotated meaningful content related to digital initiatives. The companies were then categorized into one of four maturity levels, the requirements for which were predefined (based on Westerman *et al.*, 2012; referenced in the literature review) based on the depth of digital transformation initiatives adopted. The depth of digital transformation initiatives increases as the levels progress. The maturity levels of 1–4 utilized in the measure were informed by the work of Gökalp and Martinez (2021) who reviewed 18 maturity models to construct their digital transformation capability maturity model. We utilized their model as a reference to establish the maturity levels for the current study's digital maturity measure. The maturity levels are defined as follows:

(1) Level 1: The digital transformation initiative has been started. The vision for digital transformation exists, but digital transformation initiatives have not been entirely implemented.

(2) Level 2: Digital transformation is being managed at this level, and relevant initiatives have been implemented in several complementary processes.

(3) Level 3: Digital transformation has been robustly established at this level. Key processes are well defined, and organizational change is being managed at this level.

(4) Level 4: There is sophisticated exploitation of real-time data for products, services or processes accompanied by continuous improvement and dynamic cooperation.

Specifically, the search yielded an operationalization scale ranging from 1 to 4 (1 = maturity level 1, 2 = maturity level 2, 3 = maturity level 3, 4 = maturity level 4), where the variable was constructed based on the depth of the operations in which digital transformation was implemented.

4.2.4 Financial success. We utilized two operational performance measures to measure companies' financial success: net profit and operating profit. These types of operation-based performance measures have previously been adopted in studies examining the connection between digital transformation and performance (Sousa-Zomer *et al.*, 2020; Wamba *et al.*, 2017). Company size, revenue change, industry and ownership were used as control variables. Company size was measured as the number of employees, and revenue change was measured as the percentage of increase or decrease compared to previous years. Revenue change was considered an important control variable because the studied companies differed in size and operated in different sectors. In addition, dummy variables were included to divide the industrial and service sectors and to identify ownership (i.e. stock or nonstock), since listed companies are likely to have profit requirements decreed by their owners, which may affect profit maximization and any corresponding analyses.

5. Result and analysis

5.1 Model assessment

A correlation analysis was conducted to analyze the research validity. As shown in Table 3, the significant correlation confirmed a relationship between the given variables. Furthermore, the likelihood of multicollinearity was checked using collinearity statistics (variance inflation factors [VIFs] and tolerance). As suggested by Kleinbaum *et al.* (1988), the accepted values for VIFs and tolerance are <5 and >0.2. In this study, the value for the VIF was 1.051 to 2.795, and that for tolerance was 0.358 the 0.952, indicating no possibility of multicollinearity.

5.2 Regression analysis

A regression analysis was applied to examine the five proposed hypotheses, which were developed based on the literature. Of the hypotheses, two (H1 and H2) test for a direct effect, two (H3 and H4) test for mediating effects, and one (H5) tests for moderating effects. The results for the direct effects can be seen in Tables 4 and 5 (Models 2, 5, 10 and 14), those for mediating effects are presented in Table 4 (Models 1–7), and those for moderating effects appear in Table 5 (Models 8–15). The results of the hypotheses are explained, and then each model is described in detail.

For H1 (digital orientation affects financial success), the results indicate that digital orientation does not affect financial success, defined as net profit ($\beta = -0.197$, p-Value > 0.1, nsg.) and operating profit ($\beta = -0.211$, p-Value > 0.1, nsg.). Thus, H1 cannot be accepted.

	Digital orientation	Digital maturity	Digital intensity	Net profit	Operating profit
Digital orientation	1				
Digital maturity	0.876**	1			
Digital intensity	0.768**	0.816**	1		
Net profit	0.196**	0.143*	0.096	1	
Operating profit	0.223**	0.152*	0.139	0.906**	1

Note(s): **. Correlation is significant at the 0.01 level
*. Correlation is significant at the 0.05 level

Table 3.
Correlation matrix

Table 4.
Results of mediation analyses

Dependent variables	Financial success						
	Model 1	Net profit Model 2	Model 3	Model 4	Operating profit Model 5	Model 6	Digital maturity Model 7
Controls							
No. of employees	0.016*** (0.002)	0.016*** (0.002)	0.016*** (0.002)	0.023*** (0.002)	0.024*** (0.002)	0.024*** (0.002)	1,107E-6 (0.000)
Revenue change	−0.134 (1,356)	−0.127 (1,365)	−0.178 (1,352)	−0.151 (1,530)	−0.151 (1,541)	−0.206 (1,528)	0.001 (0.002)
Industry	−30,614 (43,044)	−31,348 (43,953)	−24,013 (43,658)	−40,969 (48,575)	−42,569 (49,616)	−34,675 (49,347)	−0.093 (0.070)
Ownership	51,122 (44,876)	52,845 (45,473)	47,578 (45,084)	59,457 (50,642)	59,452 (51,332)	53,784 (50,958)	0.056 (0.080)
Main effects							
Digital orientation		−0.197 (,996)	−0.856 (1,040)		−0.211 (1,124)	−0.920 (1,175)	0.003*** (0.001)
Digital intensity		−1,902 (14,124)	−25,018 (18,210)		2,245 (15,944)	−22,633 (20,582)	0.323*** (0.020)
Mediation effect							
Digital maturity			81,028* (40,907)			87,202* (46,236)	
Model summary							
F	17,258 ***	11,375 ***	10,514 ***	28,973 ***	19,054 ***	17,139 ***	71,821 ***
R^2	0.327	0.328	0.346	0.449	0.450	0.463	0.678
Adjusted R^2	0.308	0.299	0.313	0.434	0.426	0.436	0.668

Note(s): Unstandardized coefficients and standard errors (in parentheses) are reported
***$p \leq 0.001$, ** $0.001 < p \leq 0.01$, * $0.01 < p \leq 0.1$

Table 5.
Results of moderation analyses

	Financial success							
Dependent variables	Net profit					Operating profit		
	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
Controls								
No. of employees	−0.016*** (−0.002)	−0.016*** (−0.002)	−0.016*** (0.002)	−0.016*** (0.002)	−0.023*** (0.002)	−0.024*** (0.002)	−0.024*** (0.002)	−0.026*** (0.003)
Revenue change	−0.134 (1,356)	−0.129 (1,361)	−0.127 (1,365)	−0.219 (1,324)	−0.151 (1,530)	−0.148 (1,536)	−0.151 (1,541)	−0.249 (1,501)
Industry	−30,614 (43,044)	−32,124 (43,421)	−31,348 (43,953)	−18,101 (42,823)	−40,969 (48,575)	−41,653 (49,016)	−42,569 (49,616)	−28,444 (48,526)
Ownership	51,122 (44,876)	52,364 (45,174)	52,845 (45,473)	28,048 (44,787)	59,457 (50,642)	60,020 (50,995)	59,452 (51,332)	33,012 (50,752)
Main effects								
Digital orientation		−0.272 (−0.824)	−0.197 (−0.996)	8,043 (2,789**)		−0.123 (−0.930)	−0.211 (1,124)	8,574 (3,160**)
Moderation effects								
Digital intensity			−1,902 (14,124)	23,058 (15,822)			2,245 (15,944)	28,859 (17,929)
Interaction effect								
Digital orientation*				−1,508**				−1,608**
Digital intensity				(0.479)				(0.543)
Model summary								
F	17,258***	13,742***	11,375***	11,788***	28,973***	23,021***	19,054***	18,495***
R^2	0.327	0.328	0.328	0.373	0.449	0.449	0.450	0.482
Adjusted R^2	0.308	0.304	0.299	0.341	0.434	0.430	0.426	0.456

Note(s): Unstandardized coefficients and standard errors (in parentheses) are reported
***$p \leq 0.001$, ** $0.001 < p \leq 0.01$, * $0.01 < p \leq 0.1$

For H2 (digital intensity affects financial success), the same models were analyzed. The results indicate that digital intensity does not affect financial success, defined as net profit ($\beta = -1.902$, p-Value > 0.1, nsg.) and operating profit ($\beta = 2.245$, p-Value > 0.1, nsg.). Accordingly, H2 also cannot be accepted. For H3 (digital maturity facilitates the relation between digital orientation and financial success), the results indicate that digital maturity fully mediates the relationship between digital orientation and financial success in terms of both net profit ($\beta = 81.028$, p-Value ≤ 0.1, sg.) and operating profit ($\beta = 87.202$, p-Value ≤ 0.1, sg.). Thus, H3 can be accepted. For H4 (digital maturity facilitates the relation between digital intensity and financial success), the results demonstrate that digital maturity fully mediates the relationship between digital intensity and financial success in terms of both net profit ($\beta = 81.028$, p-Value ≤ 0.1, sg.) and operating profit ($\beta = 87.202$, p-Value ≤ 0.1, sg.). Therefore, H4 can also be accepted. Finally, for H5 (digital intensity strengthens the relation between digital orientation and financial success), the results indicate that digital intensity fully moderates the relationship between digital orientation and financial success in terms of both net profit ($\beta = -1.508$, p-Value ≤ 0.01, sg.) and operating profit ($\beta = -1{,}608$, p-Value ≤ 0.01, sg.). Thus, H5 can be fully accepted.

Table 4 presents the results for direct and mediating effects. According to Baron and Kenny (1986), three steps are required to check whether there is a full mediating effect. First, a regression analysis between the dependent and independent variables (Models 2 and 5) should not indicate any significant effects between them. Second, a regression analysis between the dependent variable and the mediator (Models 3 and 6) should indicate significant effects between them. Third, a regression analysis between the mediator and the independent variable (Model 7) should indicate significant effects between them. For each dependent variable (net profit and operating profit), three models are presented. Models 1–3 concern financial success in terms of net profit. Model 1 only encompasses control variables, checking the effects of control variables on net profit. As shown in Table 4 (Model 1), none of the control variables, except number of employees ($\beta = 0.016$, p-Value ≤ 0.001, sg.), significantly affect net profit. This means that the effects are stronger in companies with more employees. Model 2 includes both control variables and main effects, and it checks the direct effects of digital orientation and digital intensity on net profit. As shown in Table 4 (Model 2), there is no significant direct effect between the independent variables – that is, digital orientation ($\beta = -0.197$, p-Value > 0.1, nsg.) and digital intensity ($\beta = -1.902$, p-Value > 0.1, nsg.) – and net profit (dependent variable). Model 3 includes the control variables, the main effects and the mediation effects. As shown in Table 4 (Model 3), digital maturity fully mediates the relationships between digital orientation and net profit and between digital intensity and net profit ($\beta = 81.028$, p-Value ≤ 0.1, sg.). Model 7 used a regression analysis between the mediator and the independent variables. As shown in Table 4 (Model 7), both digital orientation ($\beta = 0.003$, p-Value ≤ 0.001, sg.) and digital intensity ($\beta = 0.323$, p-Value ≤ 0.001, sg.) significantly affect digital maturity. Models 4–6 address financial success in terms of operating profit. Model 4 only covers control variables, checking their effect on operating profit. As demonstrated in Table 4 (Model 4), none of the control variables, except for number of employees ($\beta = 0.023$, p-Value ≤ 0.001, sg.), significantly affected the operating profit. This also suggests that the effects are stronger in companies with more employees. Model 5 includes control variables and main effects, which checks the direct effect of digital orientation and digital intensity on operating profit. As shown in Table 4 (Model 5), there was no significant, direct effect between the independent variables of digital orientation ($\beta = -0.211$, p-Value > 0.1, nsg.) and digital intensity ($\beta = 2.245$, p-Value > 0.1, nsg.) and dependent variable of operating profit. Model 6 includes control variables, main effects and mediation effects. As shown in Table 4 (Model 6), digital maturity mediates the relationships between digital orientation and operating profit and between digital intensity and operating profit ($\beta = 87.207$, p-Value ≤ 0.1, sg.).

Table 5 presents the results for direct and moderating effects, where the same procedure recommended by Baron and Kenny (1986) was applied. First, a regression analysis was applied to the dependent and independent variables (Models 9 and 3), between which no significant effects should be found. Second, a regression analysis was applied to the dependent and moderator variables (Models 10 and 14), between which no significant effects should be found. Third, a regression analysis was applied to the dependent variables and the interactions between the independent and moderator variables (Models 11 and 15). For each dependent variable (i.e. net profit and operating profit), four models are presented in Table 5. With regard to financial success in terms of net profit, four models (Models 8–11) were analyzed. First, the control variables were entered into the model, and their effects on net profit were analyzed. As shown in Table 5 (Model 8), none of the control variables except for the number of employees ($\beta = 0.016$, p-Value ≤ 0.001, sg.) were significantly affected by net profit. Then, the independent variable was entered into the model, and its effect on net profit was examined. As shown in Table 5 (Model 9), there was no significant direct effect between net profit and digital orientation ($\beta = -2{,}277$, p-Value > 0.05, nsg.). Next, the moderator variable was entered into the model to examine all the effects on net profit. As can be seen in Table 5 (Model 10), no significant effects were found between digital orientation and net profit ($\beta = -0.197$, p-Value > 0.05, nsg.) or between digital intensity and net profit ($\beta = -1.902$, p-Value > 0.05, nsg.). Finally, the interaction effect was entered into the model to analyze the interaction effects on net profit. As shown in Table 5 (Model 11), digital intensity significantly moderated the relationship between digital orientation and net profit ($\beta = -1.508$, p-Value $\leq$ 0.01, sg.). With regard to financial success in terms of operating profit, four models (Models 12–15) were analyzed. First, the control variables were entered into the model, and their effects on net profit were analyzed. As shown in Table 5 (Model 12), none of the control variables were significantly affected by operating profit, except for number of employees ($\beta = 0.023$, p-Value ≤ 0.001, sg.). Then, the independent variable was entered into the model, and its effect on operating profit was examined. As presented in Table 5 (Model 13), there was no significant direct effect between operating profit and digital orientation ($\beta = -0.123$, p-Value > 0.1, nsg.). Next, the moderator variable was entered into the model to examine all the effects on operating profit. As can be seen in Table 5 (Model 14), no significant effects were found between digital orientation and operating profit ($\beta = -0.211$, p-Value > 0.1, nsg.) or between digital intensity and operating profit ($\beta = 2.245$, p-Value > 0.1, nsg.). Finally, the interaction effect was entered into the model to analyze the interaction effects on net profit. As shown in Table 5 (Model 15), digital intensity significantly moderated the relationship between digital orientation and operating profit ($\beta = -1.608$, p-Value ≤ 0.01, sg.).

To conclude, the different conducted regression analyses yielded different results. First, there was no direct effect between digital orientation and financial success or between digital intensity and financial success. However, digital maturity fully mediated the relations between digital orientation and financial success and between digital intensity and financial success. Second, digital intensity negatively moderated the relation between digital orientation and financial success. A summary of the hypothesis test results can be observed in Table 6.

6. Discussion

This study was based on prior notions that no industry is safe from the effects of digital transformation (Chen *et al.*, 2021; Hess *et al.*, 2016; Lanzolla *et al.*, 2018; Sousa-Zomer *et al.*, 2020; Vial, 2019), as well as on the countless failures in digital investments, which signal a low level of understanding about how to turn digital transformation into profitable outcomes (Libert *et al.*, 2016; Matt *et al.*, 2015; Vial, 2019). Our findings contribute to the idea that, for companies to succeed in digital transformation, there is a need for a strategic approach that encompasses

Hypothesis	Models	Hypothesis support	Interpretation
H1: Digital orientation affects financial success	2, 5, 10, 14	Not supported	Digital orientation does not directly contribute to the financial success of companies
H2: Digital intensity affects financial success	2, 5, 10, 14	Not supported	Digital intensity does not directly contribute to the financial success of companies
H3: Digital maturity facilitates the relation between digital orientation and financial success	1–7	Fully supported	Digital maturity acts as a mediator between digital orientation and the financial success of companies. Digital orientation positively affects financial success via digital maturity
H4: Digital maturity facilitates the relation between digital intensity and financial success	1–7	Fully supported	Digital maturity acts as a mediator between digital intensity and the financial success of companies. Digital intensity positively affects financial success via digital maturity
H5: Digital intensity strengthens the relation between digital orientation and financial success	8–15	Fully supported	Digital intensity negatively moderates the relation between digital orientation and the financial success of companies. Digital intensity decreases the contribution of digital orientation to financial success

Table 6. Summary of hypothesis test results

and interconnects the critical elements in digital transformation settings (Hess *et al.*, 2016; Saunila *et al.*, 2021a; Ukko *et al.*, 2019; Vial, 2019). Prior studies have identified three strategic antecedents of digital transformation – digital orientation, digital intensity and digital maturity – and examined how companies should adopt these elements to attain financial success. Extant findings have strongly emphasized that digital orientation, digital intensity and digital maturity should be considered strategic elements in companies' pursuit of financial performance in digital transformation (e.g. Hess *et al.*, 2016; Kindermann *et al.*, 2021; Matt *et al.*, 2015; Ukko *et al.*, 2019; Vial, 2019). This argument can be justified in several ways. *First*, the findings showed that all three antecedents of digital transformation affect companies' financial performance, making them relevant from a strategy perspective. However, none of the antecedents had a direct impact on financial performance; rather, the effects came through their interconnections (i.e. the mediation and moderation models). This finding further illustrates the strategic importance of these elements, emphasizing that none of them should be excluded from review. *Second*, because the effects on financial performance are realized through the interconnections among the three antecedents, these antecedents must be viewed simultaneously in the same conceptual framework, both in theory and among practitioners. *Third*, the results indicate that companies must understand and be able to assess the current state of digital orientation, digital intensity and digital maturity to make strategic choices concerning which path to follow to achieve financial success. Although Dattée *et al.* (2018) and Nambisan *et al.* (2017) concluded that decisions about the scale and scope of operations within or withdrawal from digital operations remain difficult strategic choices; the findings of the present study identify strong starting points for moving towards financial performance in digital transformation. In the following, the study findings are compared to those of prior studies on digital orientation, digital intensity and digital maturity.

First, this study supports the important role of *digital maturity* (Arkhipova and Vaia, 2018; Gurumurthy *et al.*, 2020; Westerman *et al.*, 2012), as it play a key mediator role in achieving

financial performance from digital orientation and intensity. The results show that digital intensity and digital orientation alone cannot provide financial success for companies, as a certain level of digital maturity is needed to achieve financial success. This finding confirms the critical roles of processes and skills in digital transformation (Kane *et al.*, 2017; Westerman *et al.*, 2012), as digital maturity can prepare companies to sustain proper value in dynamic and swift digital environments. However, whereas prior research has shown that digital maturity mediates, for example, information technology capabilities and the emergence of innovation (Arkhipova and Vaia, 2018; Khin and Ho, 2019), the present study uncovers the novel finding that these effects extend all the way to financial performance. Furthermore, this finding aligns with previous literature, which has confirmed the need for digital maturity in digital transformation to achieve success (Arkhipova and Vaia, 2018; Fettermann *et al.*, 2018). The results of this study take the work of Warner and Wäger (2019) a leap forward. Warner and Wäger (2019) determined that digital intensity assists digital maturity. In this study, digital maturity was found to act as a mediator between digital intensity and companies' financial success, indicating that digital intensity has a positive effect on digital maturity, which has a downstream effect on financial success.

Second, this study reveals the controversial effect of *digital intensity*. Although many prior studies suggest that, since the different areas of a company operate within digital initiatives, digital intensity is associated with financial success (Mithas *et al.*, 2012; Sousa-Zomer *et al.*, 2020; Westerman *et al.*, 2012), the results of this study do not fully support this. On one hand, the results indicate that digital intensity could hinder the relationship between digital orientation and financial success. This can be interpreted as meaning that digital intensity concentrated across a wide scope of different areas can jeopardize control over business, ultimately risking the achievement of financial success. This can occur when companies exhibit high digital intensity across vast numbers of digital operations, engaged actors and complexities (Hess *et al.*, 2016; Vial, 2019), but have not yet achieved high digital maturity (Kane *et al.*, 2017). This result supports the work of Dattée *et al.* (2018) and Nambisan *et al.* (2017), who noted the difficulty of making strategic decisions concerning the scope and scale of digital operations. Additionally, this result supports the idea of being selective (Matt *et al.*, 2015) and having a clear vision (Dattée *et al.*, 2018; Nambisan *et al.*, 2017; Westerman *et al.*, 2012) to choose domain and scope when digitalizing business. On the other hand, the results indicate that digital intensity does not directly contribute to the financial success; rather, the effects on financial performance are realized through the mediating effect of digital maturity. This result is, to some extent, in line with the findings of Sousa-Zomer *et al.* (2020) and Warner and Wäger (2019), who considered digital intensity to be an influential factor in digital transformation capable of accelerating companies' digital maturity. Although digital intensity can increase the difficulties of creating financial performance (Hess *et al.*, 2016; Vial, 2019), the results indicate that digital maturity can help overcome this challenge.

Third, this study challenges the role of *digital orientation* in gaining financial success. Although some prior studies have reported that digital orientation may lead to financial success by mitigating and reducing operational difficulties related to firms' digital orientation and commitment to use digital technology, which enable firms to implement differentiated digital solutions swiftly or add new digital entities to existing solutions (Arias-Pérez and Vélez-Jaramillo, 2022; Porter and Heppelmann, 2014; Vial, 2019), the findings of the present study do not support this. The results of this study are inconsistent compared to, for example, Gurumurthy *et al.*'s (2020) findings, which showed that companies that commit to the usage of digital technology can increase revenues by 15% at the starting point. However, Gurumurthy *et al.* (2020) showed that revenue growth was self-reported compared to the industry average, and the level of commitment in the use of digital technologies was also self-reported, showing no statistically proven link between these variables. Therefore, based on the statistical analysis in this study, we showed that digital

orientation does not directly contribute to financial success. Instead, the effects on financial performance are realized in the presence of a certain level of digital maturity. This result supports Fettermann *et al.*'s (2018) findings concerning Industry 4.0 cases, indicating that the effects of these technologies increase in parallel with the level of digital maturity. These results also support the work by Gurumurthy *et al.* (2020), who suggested that companies that commit to the usage of digital technology will increase their revenues substantially when a certain digital maturity level is reached.

Finally, the findings emphasize the strategic aspect of digital orientation, given the importance of ways of identifying the interconnections between digital orientation, digital intensity and digital maturity and related constructs (c.f. MacKenzie *et al.*, 2011), as well as the need for orientation to provide strategic guidelines in selecting, developing and implementing successful initiatives (c.f. Kindermann *et al.*, 2021). We share the perspective that, when aiming to reach the full potential of digital transformation for the sake of financial success, it is not sufficient simply to be committed and open to using new technologies (Hess *et al.*, 2016; Kane *et al.*, 2017; Matt *et al.*, 2015; Vial, 2019). However, the present study suggests that, to turn digital transformation into financial success, all three strategic antecedents of digital transformation (i.e. digital orientation, digital intensity and digital maturity) should be in place and interconnected. It also concludes that, in the unpredictable digital economy, it is nearly impossible to identify the path and destination of digital transformation from the beginning (Li, 2020). However, this study provides numerous insights into the paths that can be used to achieve financial success in digital transformation.

7. Conclusion

Drawing on the literature pertaining to strategic management and digital transformation, the present study examined three relevant antecedents of digital transformation (i.e. digital orientation, digital intensity and digital maturity) and determined their influence on the financial success of companies. This study of interconnections is a novel contribution to previous primarily bilateral research on the connections between digital orientation, digital intensity and digital maturity. The following section presents theoretical and managerial implications, as well as limitations and directions for further research.

7.1 Theoretical implications

Previous research (e.g. Li, 2020; Nasiri *et al.*, 2020b) has called for further studies to explain how digital transformation determines companies' financial success. As a theoretical implication, this study enhances the understanding of digital transformation at the organizational level by revealing its antecedents, which can affect companies' financial success. The findings reveal that benefiting from digital transformation requires a holistic understanding and combinations of antecedents. Digital orientation and digital intensity alone do not contribute to companies' financial success. Specifically, digital intensity has a negative moderation effect between digital orientation and financial success, meaning that it reduces the performance effects of digital orientation. Digital maturity acts as a mediator between digital orientation and the financial success of companies and between digital intensity and the financial success of companies. Thus, both digital orientation and digital intensity indirectly affect financial success via digital maturity. This implies that neither openness nor commitment to using digital technologies nor the breadth of company operations to which digital transformation is connected improves companies' performance. Rather, placing emphasis on building an ongoing process of adjusting to the transforming digital environment (meaning enhancing digital maturity) can foster financial success via

digital transformation. On one hand, the present study presents a definition for scholars to use in further research when testing additional relations among elements of digital transformation. On the other, by testing the research framework, the current study offers a novel understanding of the performance effects of digital transformation and the relations among its antecedents, which have been previously unexplored in the literature.

7.2 Managerial implications

The study also offers information for practitioners to select distinct activities for strategizing and organizing digital transformation. First, managers must understand digital orientation, digital intensity and digital maturity as strategic elements in digital transformation, since impacts on financial performance are realized through the joint implications of these elements. Second, managers need to review these elements simultaneously and in conjunction to assess their current importance and status and to make strategic choices that foster financial success. Third, managers must understand the key mediating role of digital maturity when seeking financial success in digital transformation. Internalizing that digital maturity is a continuous approach progress that encompasses processes and skills will help managers prepare their companies to create proper value in dynamic and swift digital environments. Managers should realize that a certain level of digital maturity is needed to achieve financial performance from digital intensity and digital orientation, since the effects of selected technologies increase in parallel with the level of digital maturity. Fourth, managers should remember that applying digital transformation simultaneously to too many developing business areas may jeopardize control of the business and will not contribute to the financial success of the company. In some cases, this approach can even decrease profits. Rather, managers should emphasize selectivity and the need for a clear vision for choosing domain and scope when digitalizing business. This means developing a continuous process of adopting digital technologies both purposefully and consistently.

7.3 Limitations and further research

The present study has some limitations that provide opportunities for future work. First, the employed statistical approach (built on secondary data) only captures certain characteristics of the complex phenomenon of digital transformation. This is because it synthesizes information from multiple sources and views, thereby avoiding the biases inherent when sourcing data from a single respondent. However, further research is needed to review the consistency of the results, as there may be issues with digital transformation that cannot be identified through secondary data. Second, despite careful validation of the constructs and data collection, the process of understanding the performance effects of digital transformation is at an early stage. Here, further studies could validate the results with empirical qualitative and quantitative approaches. For example, a larger sample would be useful to engender methodological triangulation, thereby increasing validity. Finally, the data only contain results from large companies, meaning further research is required to investigate their applicability to smaller companies. For example, though digital intensity yielded negative effects in large companies, the situation may be even worse for smaller companies. Thus, further research should provide guidance on strategizing and organizing for small companies undergoing digital transformation. More research should also be conducted to assess other independent variables and their combined effects on various performance outcomes. A comparison of distinct digital transformation profiles would also shed a light on the means by which they contribute to enhanced performance. Finally, the results have a potential to provide input to dual orientation literature (e.g. Visnjic *et al.*, 2021) to manage paradoxes and challenges of digital transformation.

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Further reading

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