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Going digital and intangible: intangible investments effects on a company's success

Technologie cyfrowe i kapitał niematerialny: wpływ inwestycji niematerialnych na sukces firmy

Abstract

This paper empirically examines the success factors resulting from intangible capital, including computer-based information, as the main drivers of knowledge-based digital growth. The data were collected via a survey on investment in intangible capital and digital technologies. The Stata SEM package was used to estimate the model. The results show that investing in intangible capital has a positive impact on corporate success relative to the competition, and that investing in intangible assets, combined with business agility, enable rapid responses to competitive pressures and improve business performance. Companies that operate in highly competitive markets, where intangible capital is a key success factor, would be well advised to focus on investing in intangibles when designing their business strategies.

Keywords: investments, business performance, digitalisation, Intangible capital, competition pressure

JEL: E22, O30, O32

Streszczenie

Artykuł przedstawia empiryczną analizę czynników sukcesu warunkowanych przez kapitał niematerialny, w tym informacje oparte na systemach komputerowych, jako głównych motywatorów rozwoju cyfrowego opartego na wiedzy. Dane do analizy zostały zebrane za pomocą ankiety dotyczącej inwestycji w kapitał niematerialny i technologie cyfrowe. Do oszacowania modelu wykorzystano pakiet Stata SEM. Na podstawie uzyskanych wyników można stwierdzić, że inwestowanie w kapitał niematerialny ma pozytywny wpływ na sukces firmy w porównaniu z osiągnięciami konkurencji, a inwestowanie w aktywa niematerialne w połączeniu z elastycznością biznesową umożliwia szybkie reagowanie na presję konkurencyjną i poprawę wyników biznesowych. Firmy, które działają na wysoce konkurencyjnych rynkach, gdzie kapitał niematerialny jest kluczowym czynnikiem sukcesu, powinny skoncentrować się na inwestowaniu w wartości niematerialne i prawne podczas projektowania swoich strategii biznesowych.

Słowa kluczowe: inwestycje, wyniki biznesowe, cyfryzacja, kapitał niematerialny, presja konkurencyjna

JEL: E22, O30, O32



1. Introduction

In recent decades, the emergence of a 'new, knowledge-based economy', with new technologies, software, artificial intelligence (AI), and algorithms, has resulted in fundamental changes to production systems, as well as our everyday lives (Jorgenson and Timmer, 2011; OECD, 2013). In some research projects (Hagberg, Sundstrom and Egels-Zandén, 2016; Hess et al., 2016; Parviainen et al., 2017), the term 'digitalisation' denotes the changes arising from digital technologies and the automation of processes using information technologies (IT) (Hess et al., 2016). Digital technology is driving economic growth by incentivising efficiency, quality, and innovation. However, digitalisation is part of a broader shift in the growth paradigm; one marked by a pronounced trend towards intangible, knowledge-based sources of growth. The recent literature on the topic describes the significant efforts being made to open the 'black box' of business performance, and demonstrates that knowledge-based or intangible resources are the key drivers of productivity growth at both the company and national levels (Corrado, Hulten and Sichel, 2009; Piekola, 2011; Inklaar et al., 2020). Digitalisation is 'intangible' in many of its elements and features, and is also an important component of the generally accepted definition of intangible capital. Following the well-established definition of (Corrado, Sichel and Hulten, 2006), intangible capital consists of computerised information, innovative capital, and economic competencies. Moreover, evidence related to the study of human capital and skills (Gruber, 2017; Pichler and Stehrer, 2021), i.e. economic competencies, shows that a failure to invest in either or an insufficiency of appropriate human capital are two of the major barriers to successful digital transformation (Čater et al., 2021a; Maravić, Redek and Čater, 2022). Digitalisation is also closely linked to innovation (Rachinger et al., 2018) and the transformation of business models, including improved decision making based on the capabilities of data-driven decisions (Godnov and Redek, 2016). However, while digitalisation is indisputably a component of intangible or knowledge-based capital, the literature has little to say about the nature of digital and intangible investments and their interdependence (Erjavec and Redek, 2022).

This paper empirically examines the success factors resulting from intangible capital, including computer-based information, as the main drivers of knowledge-based digital growth. First, it argues that computer-based information, software, and databases are a composite part of the intangible capital at the core of the digitalisation process. Second, as digital transformation is itself 'intangible, knowledge-based' capital, this paper contends that the success factors that result from digitalisation can be explained by the success factors that result from investing in intangibles (i.e. from an increase in intangible capital). Third, it argues that both digitalisation and intangible capital support the digitalisation process due to their complementarity, and that they consequently impact business performance.

The analysis of the success factors resulting from intangible capital is based on survey data collected from a sample of companies from a small, open, export-oriented economy. The results show that investing in intangibles has a positive impact on corporate success relative to the competition. Companies operating in

highly competitive markets, where competitors invest significantly in intangibles, recognise the strategic importance of intangibles and the necessity of investing in them. The results additionally show that investing in intangibles, combined with business agility, enable rapid responses to competitive pressures and improve business performance.

This study adds to the body of knowledge on digitalisation in several ways. It is one of the first to stress that digitalisation is a component of the broader knowledge economy, and as such, an intangible knowledge-based asset. It further adds to the literature by examining the success factors that result from investing in these assets and then systematically builds a model that explains the level of investment. It thereby provides a comprehensive overview of the process and demonstrates both the importance of such investment and the contribution it can make to business performance. This has implications for corporate management and, in acknowledgement of its limitations, suggests several areas for future research.

The remainder of the article begins by explaining the theoretical background and developing the hypotheses. The conceptual model is then presented. Next, the methodology is explained and the empirical results presented. A discussion of the results, along with their implications and limitations, follows. The main findings are summarised in the conclusion.

2. Theoretical background and hypothesis development

Digitalisation, software and intangible capital

The term ‘digitalisation’ denotes the transformation of various aspects and processes of a company through the utilisation of digital technologies (Rachinger et al., 2018). It encompasses the harnessing and integration of digital technologies, e.g. computers, software, data analytics, artificial intelligence (AI), and the Internet of Things (IoT), for the purposes of collecting, storing, analysing, and disseminating digital data in order to facilitate the automation, optimisation, and innovation of processes and services (Parviainen et al., 2017; Björkdahl, 2020). Digitalisation is closely linked to the concept of intangible capital, which according to the well-established Corrado, Sichel and Hulten (2006) definition, comprises computerised information, innovative capital, and economic competencies. The term ‘computerised information’ denotes computer software and databases closely linked to other digital tools. ‘Innovative property’ includes expenditure on R&D, mineral exploration and evaluation, copyrights and licences, development costs in financial industry, and architectural and engineering designs. Economic competencies are the largest category and include company-specific capital and human resources (including the costs of in-house training and improving organisational structures). Intangible capital is becoming increasingly important, even surpassing the importance and contribution of physical capital to business performance, in a growing number of companies (Haskel and Westlake, 2018). For example, Corrado, Hulten and Sichel (2009) estimate that intangible capital accounts for up to 25% of total productivity growth. A number

of other studies confirm the contribution and increasing importance of intangible capital, including its digital aspects, to business performance (e.g. Mariela Dal Borgo et al., 2013; Jona lasinio et al., 2014; Acharya, 2016; Roth, 2020).

Investments in digitalisation and intangible capital driven by competitive pressures and the activities of competitors

The relationship between market competition and new technologies has been discussed extensively in the literature since the 1930s (Schumpeter, 1934, 1942) By contrast, new digital technologies have only been seriously studied since the onset of the Fourth Industrial Revolution about 20 years ago (Brynjolfsson and McAfee, 2011; Westerman, Bonnet and McAfee, 2014). Several theories posit that competition promotes innovation and the use of digital (new) technologies and drives the development of digital technologies (Cassiman and Veugelers, 2006; Khan, Yang and Waheed, 2019). The development of digital technologies can also foster the creation of new niche markets, while fierce competition can encourage companies to adopt digital technologies and develop various types of software (Andersson, Kusetogullari and Wernberg, 2023). The increased competition that comes with globalisation additionally affects business investment (Akdoğan and MacKay, 2012; Bachmann and Zorn, 2013; Bank, 2016). For one thing, it encourages businesses to invest in research and development, technological advancements, and process improvements to gain a competitive edge. Several studies have shown that, in a high-growth market, competitive pressures can compel companies to minimise managerial inefficiency by reducing costs, increasing quality and promoting CSR, and can motivate them to invest proactively in order to outperform their competitors (Coviello, Ghauri and Martin, 1998; Jiang et al., 2015; Khan, Yang and Waheed, 2019). Competitive pressures also affect business strategies by inducing management to place greater emphasis on those that recognise key success factors, such as intangibles (including digitalisation), likely to prevail over strong competitors (Cassiman and Veugelers, 2006; Berman, 2012) and provide the company with identifiable competitive advantages. A corporate strategy focusing on key success factors, such as intangibles, should include an investment strategy that defines and prioritises intangible investments (Khan, Yang and Waheed, 2019; Boubaker, Dang and Sassi, 2022). The following hypotheses were developed on the basis of these arguments:

H1: The strategic importance of investing in intangibles is positively affected by how heavily the competition invests in them.

H2: The strategic importance of investing in intangibles is affected by the level of competition.

H5: The actual level of investing in intangibles is positively affected by the strategic importance of doing so.

The role of skills and agility

The ability of a company to adopt digital technologies is affected by its human capital, i.e. the skills, abilities, and knowledge of its employees (Lund Vinding,

2006). Human capital is an important component of intangible capital (economic competencies). It has been defined as the collective capabilities of the employees of a company and includes their skills, knowledge, experience, and competencies (Edvinsson, 1997). Human capital is an essential component of strategic advantage and can be leveraged through its sub-dimensions, including human capital, to achieve strategic capabilities, e.g. digital capacity (Liu and Jiang, 2020). Staff capabilities are important for the development and implementation of digital technology (Baima et al., 2020). They also increase the effectiveness of decision-making processes, shorten organisational response times, and improve organisational task performance (Pinzone et al., 2017). The ability to adopt digital technologies is positively correlated with the availability of appropriately skilled labour (Petroni, Venturini and Verbano, 2012). As the EIB (2019) results show, insufficient human capital and/or a shortage of relevant skills are major barriers to investment. This paper contends that the motivation to invest in intangibles, especially human capital, is closely related to the requirement for the intangible skills that digitalisation demands (e.g. an understanding of the latest knowledge and the ability to apply it, an awareness of current trends in relevant fields, the motivation to acquire new knowledge and skills, and creativity). The motivation to invest in staff training and development (as part of the corporate strategy) is positively correlated to this.

Companies that engage in R&D (and thus invest in intangible capital) are better equipped to develop new products and services. They are also more likely to adopt and adapt to digital technologies and absorb knowledge (Cohen and Levinthal, 1990), which further enhances their efficiency and their ability to innovate. Organisational agility has also been identified as a critical factor in organisational success (Teece, Peteraf and Heaton, 2016). The term ‘organisational agility’ denotes an organisation’s ability to reinvent itself and remain operational (Shams et al., 2020). In recent years, digitalisation through the use of technology, especially IT, has helped ensure organisational competitiveness as a means of agility (Lu and Ramamurthy, 2011; Škare and Soriano, 2021; Usai et al., 2021). Few studies to date have investigated the relationship between digitalisation and agility, or the way(s) in which digitalisation might promote agility, although recent contributions suggest that organisational agility is a function of the level of digitalisation and investment in intangible assets (Lu and Ramamurthy, 2011; Škare and Soriano, 2021). To test these arguments, our model includes a variable that reflects the ability of a company to detect and adapt to changes in the market, i.e. whether its agility allows it to reap the benefits of its investment in intangible assets. The above discussion leads us to propose the following four hypotheses:

H3: Agility is positively affected by strong competition.

H4: Agility is positively affected by adequately skilled employees.

H6: Agility is conducive to business strategies that regard investing in intangibles as a key success factor.

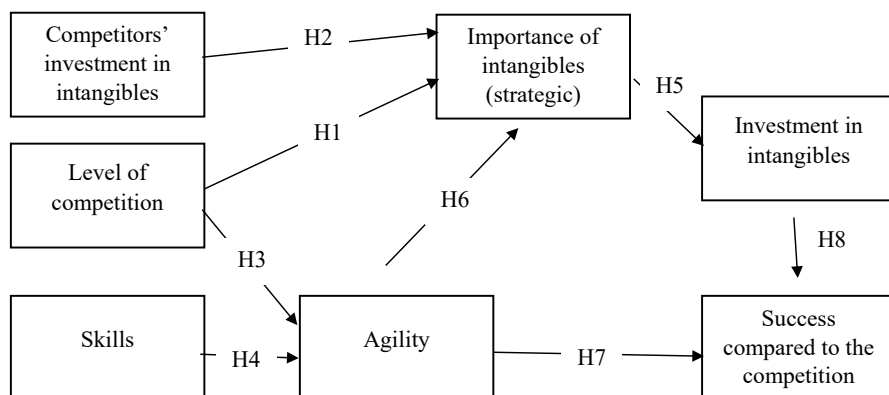
H7: Agility is positively correlated with the importance accorded to investing in intangible assets.

The effect of intangible investments on business performance

Both the financial and non-financial aspects of corporate performance are measurable. Measurable financial performance includes ROI, profitability, and cash flow (Wagner, 2010), as well as competitiveness, market share, market growth (Banker, Potter and Srinivasan, 2000), and consumer satisfaction (Anderson, Fornell and Lehmann, 1994), while non-measurable financial performance includes product quality, and innovation (Abdel-Maksoud, Dugdale and Luther, 2005) and others (Maletič, Gomišček and Maletič, 2021). The literature shows that intangible assets have a positive impact on business performance (Bosma et al., 2004; Ahmad and Murray, 2019; Seo and Kim, 2020), although this can vary significantly depending on the size of the company and the industry in which it operates (Kostevc and Redek, 2022). Digital transformation positively impacts financial performance by generating additional revenue streams (Chawla and Goyal, 2021), enhancing operational efficiency, improving quality, increasing speed, stimulating growth, and increasing demand and competitiveness (Gao, Leichter and Wei, 2012; Müller, Kiel and Voigt, 2018). It also positively impacts non-financial performance (Bharadwaj et al., 2013), by facilitating the improvement or adaptation of existing products and services, and/or the creation of new ones (Chawla and Goyal, 2021). This complementarity between digital and intangible business resources has led companies to focus on investing in intangibles, e.g. digitalisation, intellectual property, innovative capital, competencies and capabilities, etc., as these deliver competitive advantages (Erjavec and Redek, 2022). This paper contends that investing more in intangibles leads to improved business performance relative to competitors. On this basis, we hypothesise the following:

H8: Investments in intangibles positively impact company success compared to the competition.

Figure 1.
Conceptual model



As argued above, the strength of the competition and the extent to which competitors invest in intangibles determine the strategic importance of intangibles. This in turn determines the level of investments in intangibles. Our model therefore includes the impact of investing in intangibles (a proven key success factor) on the success of a company compared to its competitors. The model also includes skills and agility, as those two factors are the main enablers of a rapid and effective response to strong market competition, and affect (directly or indirectly) the strategic importance of intangibles. The model is summarised in Figure 1.

3. Empirical analysis

Methodology

The data were collected through a survey that investigated investments in intangibles and digital technologies on the part of Slovenian companies. The survey was conducted at the end of 2022. Two hundred and five fully completed questionnaires were submitted.

The questionnaire comprised 35 questions. Besides general information about the company (e.g. size, industry, employee educational structure, value added per employee, and involvement in international trade), the questionnaire sought information on the level of investment in intangibles and its importance to business strategy and competitive advantage. Next, the organizational and HR perspectives of intangible investments are captured in the questionnaire. There were questions regarding the potential barriers to intangible investments (both internal and external, e.g. financial, macroeconomic, political, regulative) and the role of the state. Both the expected and actual results of investing in intangibles were explored in detail. The questionnaire also addressed the companies' self-assessment of their market position compared to their competitors. A great deal of emphasis was placed on the proactive and reactive motives for investing in intangibles. Finally, a significant proportion of the questionnaire was devoted to the use of new technologies, the barriers to doing so, and the results having done so.

Validated scales were used for all the key constructs, except for intangible investments (see Appendix 1). The scale for intangible capital measurement and agility was generated using the modified approach presented in Bavdaž and Redek (2022) (part of the Globalinto approach (Globalinto, 2021)). The scale for measuring the level of investment in intangibles on the part of the competition, and the scale for measuring reactive motives (i.e. the level of competition and the degree of competitive pressure) were based on Obal's (2017) scales for mimetic competitor pressures and normative pressures. The scale from Banerjee, Iyer and Kashyap (2003) was used to measure expected competitive advantage. Business performance relative to competitors was measured using a scale adopted from Čater et al. (2021). Recognition of the strategic importance of intangibles was measured using a scale based on the strategic questions developed by the COTEC (2020) project. Employee competencies were measured by adapting statements from the official Eurostat 'Continuing

Vocational Training in Enterprises' survey (*slo. Izobraževanje in usposabljanje zaposlenih v podjetjih* (ŠOL-ZAP), SURS, 2015). Each statement was evaluated on a scale of 1 to 5, except for those regarding investing in intangibles (see Appendix 1). Scales were terminologically adjusted to focus on intangibles, and the number of items was lowered whenever required. The structure of the scales is provided in Appendix 1. Devisthe questionnaire also involved verifying the validity of the content, and testing the questionnaire on a small sample of respondents through interviews. Table 2 presents Cronbach's alphas and correlations for all key constructs.

Structural Equation Modelling (SEM) was used to estimate the model and its constructs. SEM is a statistical technique used in various fields, including management and the social sciences. It is a multivariate analysis method that combines factor analysis and regression analysis to examine complex relationships between observed and latent (unobserved) variables (Hoyle, 2012; Hancock and Mueller, 2013). SEM additionally assesses and validates theoretical models by analysing relationships between variables and testing hypotheses, and measures (or at least estimates) the strength, direction, and significance of these relationships (Marcoulides, 2006). SEM also enables the measurement of the direct¹ and indirect² results that arise from the relationships between variables in a specified model. These results indicate the way(s) in which one variable affects another, either directly or indirectly through one or more intermediary variables.

Descriptive statistics

The sample comprised 86% of micro and small companies and 14% of medium and large companies. This structure reflects the relative structure of Slovenian companies by size reasonably well, as the population is strongly dominated by micro and small companies. Data on the employment structure by education showed that approx. 10% have a postgraduate education, approx. 25% have an undergraduate education, and the remainder have secondary education.

A skilled labour force is crucially important for implementing digital technologies. The competences required for a successful digital transformation include an understanding of the latest knowledge and the ability to apply it, an awareness of current trends in relevant areas of expertise, the motivation to acquire knowledge and learn new skills, and creativity (new ideas, solutions, products). The first two were considered important or very important for more than 50% of the respondent companies.

Pressure from competitors and suppliers is an important factor in introducing digital technologies (Čater et al., 2019), especially when international trade is

¹ Direct results are measures of direct relationships between pairs of variables in the model. They quantify the extent to which a change in the independent variable leads to a change in the dependent variable without the assistance of any mediating variables.

² An indirect, or mediated, result is obtained when a relationship between an independent and dependent variable is mediated by one or more intermediary variables. These intermediary variables are often referred to as mediators or mediating variables.

involved (Prašnikar, Redek and Drenkovska, 2017). The questionnaire therefore addressed the involvement of the respondent companies in the international business environment. More than 70% of companies find the domestic market important or very important as a source of inputs, materials and components, and for almost 30% of them, the EU15 countries are either important or very important. Other EU³ countries are important or very important for about 10% of the respondent companies from a purchasing point of view, and countries that were part of the former Yugoslavia for 5%. The situation regarding the importance of individual sales markets is similar to that of purchasing markets. For 76% of companies, the domestic market is important or very important as a source of inputs, materials, and components, and for 27% of companies, the EU15 countries are also important or very important. Other EU countries are important or very important for 12% of the respondent companies from a purchasing point of view, and countries that were part of the former Yugoslavia for 6%.

Most of the respondent companies invested 2% or less of their revenue in intangible capital (Table 1). On average, companies allocated relatively few resources to digitalisation. Up to 58% of the respondent companies allocated 1% or less of their revenue to digitalisation (databases and software), and only 12.7% allocated more than 5%. Micro-enterprises spent the least on digitalisation. More than 50% of the respondents reported allocating 1% or less of their revenue to digitalisation, while another 8.5% allocated at least 3%. Companies with more than 50 employees spent the most on digitalisation. Approximately 25% of companies with more than 50 employees reported allocating more than 5% of their revenue to digitalisation, and another 10% reported allocating 3–5%. Other intangible investments were similarly low. More than 25% of the respondent companies reported not investing in improving organisational and business processes, and 44% reported not investing in R&D.

Table 1.

Percentage of revenue allocated to investing in intangibles in 2021

	0%	Up to 0.5%	0.5-1%	1-2%	2-3%	3-5%	5-10%	More than 10%
Databases and software	16.67	24.67	17.33	14.67	6.67	7.33	6	6.67
Organisational and business process improvements	26	20	16	12	11.33	5.33	4	5.33
Staff training and education	8.67	28	20.67	14.67	10	8	2	8
R&D*	44	20.67	8.67	4	6.67	4	3.33	8.67

Data: Survey, 2022.

*Not included in the previous categories.

³ Croatia is counted in the ‘other EU countries’ group and not as part of the former Yugoslavia.

More than 70% of the respondent companies faced very strong competition. This was a powerful incentive to constantly invest in improvements and 66% were doing so. Rapid market change had prompted approx. 60% to additionally invest in new knowledge. Approx. 46% of the respondent companies operated in industries where their competitors invested heavily in intangible capital, and approx. 40% recognised intangible capital as one of the main factors of competitive advantage. The same proportion of companies assigned the equivalent of their competitors' increase in value added to intangible capital. The respondent companies were asked whether those investments in intangibles generally recognised as 'key success factors' (viz. brand building, staff training and education, and R&D) were part of their business strategy. Approx. 67% of companies considered investing in brand building to be a key success factor, while over 75% considered investing in HR to be a key success factor. More than 90% considered investing in R&D to be a key success factor.

The respondent companies compared their business performance with those of their competitors in terms of customer loyalty, product quality, and reputation. This indicates that companies are agile, that they respond to signals from the environment, and that they monitor and respond to best practices. More than 84% claimed that they quickly recognised changes on the market and 88% quickly adapted them, while approx. 84% claimed that they quickly identified new market opportunities. Agility was also recognised as one of the factors that contributed to a more successful transition through the COVID-19 crisis (Redek et al., 2022).

Results

The empirical analysis aims to determine the factors that make a company more successful than its competitors. Theoretically, intangible investments, including computerised information, positively affect the success of a company compared to the competition. The main contention of this paper is that strong competition compels companies to have adequate business strategies; ones that recognise the importance of intangibles. Relevant skills and agility are indispensable to being able to respond to competitive pressures effectively and promptly. Structural equation models are used to analyse the way(s) in which the level of investment in intangibles on the part of a company's competitors will motivate it to design a business strategy that incorporates investing in intangibles, acquiring relevant intangible skills, and becoming more agile. All three are essential to the successful implementation of digital intangible capital. Moreover, they deliver proven competitive advantages.

The key constructs and reliability analysis results are presented in Table 2. The composite reliability (CR) values are above the required 0.70. The average variance extracted (AVE) was used to measure the reliability of the constructs. Most had a reliability above 0.5 (Fornell and Larcker, 1981), except for investment in intangibles and the importance of intangibles. However, Fornell and Larcker (1981) claim that an AVE below 0.50 might nevertheless be acceptable for a CR above 0.70. Table 2 also shows the Cronbach's alphas for all the constructs. Several authors (Cronbach, 1951; Cortina, 1993; Schmitt, 1996) have determined that the CR value should be greater than 0.7. This is true for every construct except for the importance of in-

tangibles. However, the literature (Fornell and Larcker, 1981) suggests that this is nevertheless acceptable provided the other CR values are greater than 0.7. Common method bias is a potential problem, as all the variables were generated from the same source. Some of the procedural solutions recommended by Podsakoff, MacKenzie and Podsakoff (2012) we employed to attenuate the causes of common method bias at the response reporting stage. The respondents were given anonymity so as to increase the likelihood of frankness. The conceptual framework of the study was not divulged and the constructs were mixed in order to make it difficult to infer any ‘desired’ responses. In addition, some items in the questionnaire were reversed.

Table 2.
Reliability and correlations

		CR	AVE	Investment in intangibles	Success compared to competition	Importance of intangibles (strategic)	Agility	Skills	Level of competition	Competitors' investment in intangibles
Investment in intangibles	$\alpha = 0.7688$	0.768	0.454	1						
Success compared to competition	$\alpha = 0.8518$	0.834	0.567	0.3426 0.000	1					
Importance of intangibles (strategic)	$\alpha = 0.6822$	0.717	0.467	0.4699 0.000	0.3371 0.000	1				
Agility	$\alpha = 0.7909$	0.787	0.555	0.2209 0.0039	0.4482 0.000	0.6766 0.000	1			
Skills	$\alpha = 0.8022$	0.811	0.590	0.3735 0.000	0.3588 0.000	0.6353 0.000	0.5046 0.000	1		
Level of competition	$\alpha = 0.8383$	0.842	0.642	0.3448 0.000	0.2339 0.0022	0.5646 0.000	0.4033 0.000	0.5193 0.000	1	
Competitors' investments in intangibles	$\alpha = 0.9329$	0.939	0.839	0.2786 0.0002	0.0259 0.7377	0.4392 0.000	0.1580 0.0402	0.5190 0.000	0.5138 0.000	1

Source: Own calculations.

Note: In divided cells, the first row represents the estimation and the second the significance level.

The Stata SEM package was used to estimate the model (Figure 1). Maximum-likelihood estimation was used. The conceptual model was evaluated and standard measures were used to evaluate the model fit. Confirmatory Factor Analysis was used to calculate the model fit, with Chi-squared (217) = 336.42 (p=0.000), and RMSEA=0.057 (Hu and Bentler, 1999). The CFI and TLI were 0.938 and 0.927 respectively (Schermelleh-Engel, Moosbrugger and Müller, 2003). The results are reported in Table 3. All eight hypotheses were confirmed at $p \leq 0.05$.

First, the results show that both the level of competition and the level of investment in intangibles on the part of competitors have a positive effect on the strategic importance of intangibles. Companies that operate in highly competitive markets

therefore recognise the importance of investment in intangibles as a key success factor. Agility also has a positive effect on the strategic importance of intangibles, as companies have to be able to recognise and adapt to market changes and recognise market opportunities promptly in order to remain competitive. Agility is positively affected by the possession of relevant skills. Second, recognition of the importance of investing in intangibles in a company's business strategy is positively correlated to the level of investment in intangibles. Third, a higher level of investment in intangibles improves business performance. Agility additionally has a positive impact on company success.

Table 3.

Model results (standardised coefficients are reported)

	Hypothesis	Coefficient	P>z
<i>Investment in intangibles</i>			
Importance of intangibles (strategic)	H5	0.394	0.000
<i>Success compared to competition</i>			
Investment in intangibles	H8	0.233	0.007
Agility	H7	0.362	0.000
<i>Strategic importance of intangibles</i>			
Agility	H6	0.474	0.000
Level of competition	H1	0.211	0.035
Competitors' level of investment in intangibles	H2	0.217	0.011
<i>Agility</i>			
Skills	H4	0.348	0.000
Level of competition	H3	0.192	0.049

Source: Own calculations.

Table 4 additionally reports the direct, indirect and total effects on several indicators. These results show that the strategic importance of investing in intangibles has a positive and statistically significant impact on relative business performance. A higher level of investment in intangibles on the part of competitors also has statistically significant and positive effects on the level of investment in intangibles, but its indirect impact on relative business performance is not statistically significant. Agility has a statistically significant and positive impact on the level of investment in intangibles and relative business performance. The level of competition positively and significantly impacts the level of investment in intangibles. The possession of relevant skills contribute positively and statistically significantly to the importance of intangibles.

Table 4.
Direct, indirect and total effects

	Direct effects		Indirect effects		Total effects	
Intangible investment						
	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
Strategic importance of intangibles	0.394	0.001			0.394	0.001
Agility			0.187	0.002	0.187	0.002
Skills			0.065	0.026	0.065	0.026
Level of competition			0.119	0.023	0.119	0.023
Competitors' level of investment in intangibles			0.085	0.040	0.085	0.040
Success compared to competition						
Level of investment in intangibles investment	0.233	0.010			0.233	0.010
Strategic importance of intangibles			0.092	0.034	0.092	0.034
Agility	0.361	0.016	0.043	0.036	0.405	0.008
Skills			0.141	0.038	0.141	0.038
Level of competition			0.097	0.520	0.097	0.520
Competitors' level of investment in intangibles			0.020	0.099	0.020	0.099
Strategic importance of intangibles						
Agility	0.474	0.000			0.474	0.000
Skills			0.165	0.013	0.165	0.013
Level of competition	0.211	0.050	0.091	0.078	0.302	0.008
Competitors' level of investment in intangibles	0.217	0.024			0.217	0.024
Agility						
Skills	0.348	0.002			0.348	0.002
Level of competition	0.192	0.058			0.192	0.082

Source: Own calculations.

Discussion

The results confirm the basic assumptions of this paper, viz. that digitalisation and intangibles positively impact business performance. This is in line with the growing body of literature that stresses the contribution of knowledge capital and intangible capital to business performance (Chen and Yang, 2006; Borgo et al., 2013; Scherngell, Borowiecki and Hu, 2014; Corrado, Haskel and Jona-Lasinio, 2017; Roth, 2022). This paper also stresses that skills contribute positively to the strategic importance of investment in both tangible and intangible assets. These findings

could be interpreted in the context of the role of human capital in digitalisation and recognition of the importance of human capital investments. Often, a lack of skills and/or knowledge are cited as one of the most important obstacles to investing in new technologies (Deloitte, 2015; Erol et al., 2016; Marčič and Redek, 2022).

The results confirm the findings of other research examining the motives for investing in intangible capital and digitalisation – either separately or jointly (Gruber, 2017; Škare and Soriano, 2021; Bavdaž et al., 2022; Andersson, Kusetogullari and Wernberg, 2023). Decisions to invest in intangibles are shown to be significantly influenced by competitive pressures. External motives therefore play a significant role in having investment in intangibles included or given higher priority in business strategies (Greco, Cricelli and Grimaldi, 2013). We believe that there are two fundamental explanations for these findings. The first is that businesses that recognise the competitive advantages of investing in intangibles invest more. The tentative second explanation is that many of the surveyed companies invest little in intangibles as there is no external pressure to invest more.

Theoretical implications

This discussion of theoretical implications and contributions focuses on the effect of investing in intangibles on business performance. The results concerning investing in intangibles are important because they elucidate the reasons for doing so in a more structured way. Although some papers address the determinants of investing in intangibles, their primary focus is on barriers (Thum-Thyssen et al., 2019) rather than incentives.

The paper addresses the development of digital technologies designed to assist investment in intangibles and its impact on business performance. Business performance was measured using the surveyed companies' self-evaluations of their comparative performance in product quality, innovativeness, sales growth, and market share growth on existing markets. In short, business performance is a reflection of 'long-term' competitiveness and its main determinants.

The present study adds to the existing body of knowledge on the positive effect of investing in intangibles on a company's success compared to its competitors. It ethelishes that the importance of intangibles is determined by the level of competition on the market and the level of investment in intangibles on the part of the company's competitors. The study additionally shows that business performance is indirectly linked to the strategic importance of intangibles, and to the possession of specific skills that support agility. Finally, the results highlight the importance of agility in strategically responding to competitive pressures.

Practical implications

The empirical findings have several practical implications. First, they show that strong competition exerts considerable pressure on companies to invest in intangibles, as this will ensure their long-term competition. Managers would therefore be well advised to invest more in intangibles in order to keep up with, or even

surpass, other players on the market. Second, they show that whether the strategic importance of intangibles is recognised at least partly depends on internal factors (this was also found to be the case by Čater et al. (2021)) that facilitate the use of digital technologies, viz. agility and the possession of relevant skills. These findings regarding the importance of external motives and the need to respond to competitive pressures corroborate those of Cater and Cater (2009) and Andersson, Kusetogullari and Wernberg (2023). The data shows that Slovenian companies invest less than the EU average in intangibles. Slovenia is even in the bottom 25% of EU countries in terms of intangibles as a portion of total investment (EIB, 2021, p. 20).

Managers should therefore be aware of the importance of intangibles to the competition. First, they need to accurately assess the level of competition on the market(s) in which they operate and respond by investing in relevant knowledge. Second, they need to accurately assess their competitors' level of investment in intangibles and at least match it. Third, investments in intangibles should be focused on key success factors in order to maximise value added. Companies that operate in highly competitive markets, where intangible capital is crucial to success, would be well advised to focus on investing in intangibles when designing their business strategies.

Limitations and challenges for future research

The present paper makes several important conclusions. However, as with any research, there are limitations that constitute a challenge for future research. First, the survey was a one-off. Given the nature of the topic, a longitudinal study of the companies surveyed is recommended. Second, merging the data from the survey with other data (e.g. financial statements) would allow for a deeper understanding of the nature of companies and enable a more comprehensive and thorough analysis. Finally, a larger sample would allow for a deeper understanding of the differences in the behaviour of companies over time.

4. Conclusion

This paper adds to the body of knowledge on digitalisation in several ways. It thereby provides a comprehensive overview of how digitalisation and intangible capital support each other due to their complementarity, and consequently, how they positively impact business performance. The results show that the comparative success of a company is affected by agility and the level of investment in intangibles. Companies that face strong market competition invariably recognise the strategic importance of intangibles and thus the importance of investing in them. The line of research that examines the impact of investing in intangibles on business performance is extended by focusing on the importance of intangible capital. The findings of this paper shed light on the importance of investing in intangibles to performance. This paper therefore has important implications for future empirical and theoretical research.

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A1:

Constructs

Latent variable		Variable	Mean	Std. error	dev.	Min
	Agreement with the statements (Likert scale, 1-5)					
Competitors’ investments in intangibles	Our competitors invest heavily in intangible capital.	Q27f	3.420	0.061	0.799	1
	Intangible capital is one of the main success factors of our competitors.	Q27g	3.296	0.071	0.923	1
	Intangible capital increases the added value of our competitors the most.	Q27h	3.290	0.066	0.855	1
Level of competition	We face very strong competition.	Q24c	3.893	0.066	0.852	1
	We have to constantly invest in improvements as the competition is fierce on the markets in which we operate.	Q24d	3.775	0.070	0.905	1
	We have to constantly invest in new knowledge as the markets in which we operate are subject to rapid change.	Q24e	3.680	0.071	0.928	1

Latent variable		Variable	Mean	Std. error	dev.	Min
	Agreement with the statements (Likert scale, 1-5)					
Success compared to competition**	Product quality	Q23a	3.834	0.061	0.792	2
	The company's innovation	Q23c	3.615	0.066	0.859	1
	Sales growth	Q23g	3.408	0.063	0.820	1
	Growth of market share in existing markets	Q23h	3.314	0.061	0.796	1
Skills	Possession of the latest knowledge and trends in individual areas of expertise	Q14g	3.408	0.080	1.037	1
	Motivation to learn (new knowledge and skills)	Q14h	3.568	0.069	0.891	1
	Creativity (new ideas, solutions, products)	Q14i	3.633	0.072	0.936	1
Agility	We quickly recognise changes in our market (e.g. competition, regulations, demographics)	Q10b	4.089	0.058	0.755	1
	.We quickly adapt to changes in the market.	Q10c	4.124	0.050	0.647	2
	We quickly identify new opportunities to improve our range of products and/or services.	Q10d	4.024	0.054	0.698	2
Importance of intangibles (strategic)	Investing in brand building is a key success factor.	Q9f	3.757	0.069	0.897	1
	Investing in employees, training and education is a key success factor.	Q9g	4.249	0.056	0.730	1
	We encourage the joint development of innovative strategies through the cooperation of various departments.	Q9i	3.839	0.078	1.017	1
Intangible investment***	Databases and software	Q7a	3.343	0.161	2.088	1
	Organisational and business process improvement	Q7c	3.148	0.161	2.092	1
	Staff training and education	Q7d	3.544	0.151	1.958	1
	Research and development	Q7g	2.680	0.176	2.287	1
*In the case of skills, the scale was 0-5, evaluating the importance of the possession of skills as "not important at all, not important, important, very important, of key importance»						
** In the case of success compared to the competition, the scale was 0-5, evaluating how successful a company is compared to its competitors as «significantly less successful, less successful, as successful as competitors, more successful, significantly more successful»						
***Intangible investment was measured using the following scale: 1=0%, 2=up to 0.5%, 3=0.5-1%, 4=1-2%, 5=2-3%, 6=3-5%, 7=5-10%, 8=more than 10%.						

Source: Own calculations.

Note: Validated scales refer to measurement instruments or questionnaires that have undergone rigorous validation processes to ensure their reliability and validity. These scales are used to measure specific constructs or variables of interest in a standardised and reliable manner.