

## CONSCIOUS OR INDIFFERENT – CONCERNS ON DIGITALISATION AND SUSTAINABILITY AMONG SMEs IN INDUSTRY 4.0

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### Abstract

The positive benefits of digitalisation are nowadays generally recognised and acknowledged by companies and are typically seen as essential in a rapidly and constantly changing business environment. Yet the level of digitalisation is still below expectations, especially among small and medium-sized enterprises. Several factors are behind it, ranging from high-cost concerns and management styles to a lack of knowledge etc. The present study reviews one of these aspects, the contradictory relationship between digitalisation and sustainability, with the aim of exploring the potential of digitalisation in the future and outlining new development strategies for small organisations.

This research explores the perceived impact of digitalisation on sustainability based on the opinions of SME owners and managers in the V4 countries, Bulgaria and Serbia, using a quantitative method through a questionnaire survey. Based on their perception on the topic, the surveyed organisations can be divided into two groups (Concerned Inspired, Indifferent Conservatives) and accordingly can achieve a state of balanced digitainability, where both sustainability and digitalisation performance are outstanding with different strategic steps.

*Keywords:* digitainability, digitalisation, SME, sustainability, SDGs, Visegrad Four countries, Serbia, Bulgaria

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### 1. INTRODUCTION

The increasingly competitive environment and global challenges are

forcing SMEs to operate along complex growth strategies. This serves not only to maintain their competitiveness but also to ensure their ultimate survival. Traditional

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business models that focus primarily on domestic markets and are less digitalised are becoming less viable nowadays (Park, 2018). For SMEs, addressing international markets (Lu & Beamish, 2006), digitalisation and the adoption of sustainable business models as possible development alternatives are equally challenging (Denicolai et al., 2021). This applies in particular to less developed markets, where market players are performing poorly in terms of both digitalisation (Marcysiak & Pleskacz, 2021), the incorporation of sustainable business models and internationalisation (Zamfir et al., 2017). Nevertheless, it is important to note that recent research studies have revealed several contradictions in the relationship between internationalisation, digitalisation and sustainability. While scholars typically argue that internationalisation drives firms towards more sustainable operations (Denicolai et al., 2021; Velinov et al., 2020) Park (2018) found that internationalisation is a driver for CS (corporate sustainability) score strength but also for CS concerns, i.e. companies perceive negative effects of such growth in addition to benefits. This paper does not examine the impact of internationalisation, first of all because the majority of SMEs still focus mainly on local markets, and also because the sample composition would not allow exploring the topic, given that the companies participating in the research almost exclusively identified the domestic market as their area of activity. However, the relationship between digitalisation and sustainability is reviewed in detail, in the light of the opinions of SME owners and managers in the V4 countries, Serbia and Bulgaria. The empirical research conducted focuses on SME's perceptions of the impact of digitalisation on sustainability in the countries surveyed, with the aim of

understanding their attitudes towards the two key trends and to identify ways of progress and catching up based on appropriate digitalisation and sustainability strategies. The study also discusses the applicability of the concept of *digitainability* (Gupta et al., 2020) as a recent conceptual framework (Lichtenthaler, 2021) for the integration of these two trends in the practice of SMEs.

The paper poses the following research questions (1) What is SMEs attitude towards digitainability (how the SME owners and managers perceive the impact of digitalisation on company sustainability) in the V4 countries, Serbia and Bulgaria in general? (2) Does the size, age and economic sector of SMEs influence their views on the relationship between digitalisation and sustainability?

The paper is organised as follows: after the introduction of the terms: digitalisation, sustainability and digitainability, it presents the research details such as the applied methodology and data collection methods, then the next section gives the demographic profile of the sample and presents participating SMEs' responses in general. The results section also discusses the findings and implications and the conclusions on the research questions are made in the last section.

## 2. DIGITALISATION AND SUSTAINABILITY – HALFWAY TOWARDS 'DIGITAINABILITY'

In shaping strategic objectives, both digitalisation and sustainability are now a key focus of corporate practice recently (Marcysiak & Pleskacz, 2021). This is particularly true in the post-pandemic environment, as it is no longer enough for the

businesses to respond to these challenges by initiating reactive strategies (Lichtenthaler, 2021).

Digitalisation is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities (Gartner, 2019), therefore it is clear that the ultimate goal of digital business creation requires significant transformation (Lichtenthaler, 2021), and thus Digitalisation is more of a managerial issue than a technical one (Bai et al., 2021). The attitude of businesses towards digitalisation is analysed from several aspects. In the context of organizational readiness, among other factors, technological readiness is examined, referring to the ability of the firm to adopt new and emerging technologies (Denicolai et al., 2021). The concept of digital maturity is distinct from organizational readiness. Digital maturity models help companies to define their status in the digital transformation, by reviewing the evolution of the processes, objects, human factor, corporate culture and structure (Gubán & Sándor, 2021). Another concept that emerges in the literature is digital orientation, which according to Ardito et al. (2021) reflects the strategic decision to digitalize a firm's organizational functions. While the technological readiness and maturity models refer to the current state of the enterprise, digital orientation defines the future strategic direction of businesses. Studies of the strategic orientation of companies have traditionally defined three orientations (customer, competitive and technological), which have nowadays been complemented by the digital and environmental dimensions. Environmental orientation is the strategy that integrates environmental priorities into the operation of a company (Muñoz & Dimov, 2015; Ardito et al, 2021; Zulfikar et al., 2021).

Going beyond the integration of environmental factors, corporate sustainability (CS) is about meeting the needs of the present without compromising the ability of future generations to meet their own needs (Denicolai et al., 2021; Park, 2018). According to van Marrewijk (2003), CS focuses on value creation, environmental management, green production systems, and human resource management. Mitchell et al. (2010) define sustainable market orientation as a framework in which, in addition to achieving customer satisfaction while minimising environmental burdens, companies generate positive, long-run outcomes in economic, social, and environmental terms that are acceptable for both their primary and secondary stakeholders. Two types of entrepreneurial attitudes can be distinguished according to the corporate motivations behind the implementation of sustainable operations (Muñoz & Dimov, 2015). While **insurgents** (1) initialise the move towards sustainability and include sustainable values as part of their business proposition, **conformists** (2) are market followers who shape their strategy in response to external pressures.

Researchers are exploring the link between digitalisation and sustainability at both macro and micro levels. A significant body of research investigates the system-level (e.g. economic structure, regulation) links between the two areas, while micro-level, typically sector-specific studies have identified positive effects of digitalisation in terms of cost reductions, reduction of raw material use and waste, and implicitly, improvements in customer satisfaction (Gregori & Holzmann, 2020; Acciarini et al., 2021). Despite the advantages generated by Digitalisation, there are also some concerns, mainly related to the negative social (e.g.

workforce replace) (Lichtenthaler, 2021) and environmental effects such as increased carbon emission (Acciarini et al., 2021). In conclusion, digitalisation can make a positive contribution to a firm's financial goals, but it can also have negative environmental impacts and strengthen social divides (Gupta et al., 2020).

In order to dissolve this controversial relationship between digitalisation and sustainability (sometimes mutually reinforcing, sometimes inhibiting), Lichtenthaler (2021) has created a new framework to construct the concept of 'digitainability', incorporating the two trends as two dimensions of development. The term digitainability itself was recently coined, and it refers to 'the cross-fertilisation between the processes of digitalisation and sustainable development' (Gupta et al., 2020). Within the framework the two trends of sustainability and digitalisation are used as two dimensions along which companies decide whether to strive for excellence in both areas, or to focus on one or the other, or on neither area. Based

on these criteria, enterprises can define their operations along four strategies, namely established business activities, with limited levels for Digitalisation and sustainability (1); typical sustainability activities with high level of sustainability and low level of Digitalisation (2); typical Digitalisation initiatives with programs described by high levels of Digitalisation and low levels of sustainability (3); and new digitainability opportunity which refers to a potential business strategy combining high level of sustainability and Digitalisation (4) (Figure 1).

According to company positions and management preferences, within the framework the author identifies three possible directions that can help companies to achieve at least some of the benefits of Digitalisation and sustainability. These are the exploration of digital sustainability (in this case, the focus is on sustainability programmes), the enabling of sustainable Digitalisation (initiating digital transformation), and the empowerment of balanced digitainability by combining and

<b>Sustainability</b>	High	Typical sustainability initiatives	New digitainability opportunities
	Low	Established business activities	Typical digitalisation initiatives
		Low	High
		<b>Digitalisation</b>	

Figure 1. Business strategies to follow in the matrix of digitalisation and sustainability

merging the two possible strategic directions (Lichtenthaler, 2021). However, given the typically poor performance of SMEs in both areas (Zamfir et al., 2017; Bai et al., 2021) and the resource constraints they face, it is questionable whether this model provides real practical guidance to them in their strategy formulation.

The present study explores the views of SME owners and managers on the relationship between digitalisation and sustainability in the V4 countries, Serbia and Bulgaria, taking into account both negative and positive impacts. Based on the literature review and the empirical results, the position of SMEs in the digitainability framework will be examined and possible development directions along the trends defined in the model are going to be identified.

### 3. RESEARCH FRAMEWORK AND QUESTIONS

The literature review and the questionnaire provided input to develop a theoretical framework concerning digitalisation related to company sustainability. Figure 2 outlines the research design and includes the research questions.

Consequently, the authors formulated 2 central hypotheses on digitainability among SMEs in general in the Central Eastern European region.

**H1.** Economic/Environmental benefits can be considered the most beneficial impact of digitalisation on company sustainability.

**H2.** There are significant differences in the approach to digitainability among SMEs.

The following section presents the methodology and the data collection methods together with the types of analysis, while the results section reveals the justifications for the research hypotheses.

### 4. METHODOLOGY AND DATA

The research was conducted under the project “Possibilities and barriers for Industry 4.0 implementation in SMEs in V4 countries and Serbia”. Research teams from the participating universities designed a self-administered questionnaire to collect data from SMEs in Hungary, Slovakia, the Czech Republic, Poland, Serbia and Bulgaria. The survey topic was analysed from different perspectives, Industry 4.0, digitalisation and sustainability were the main topics. The survey applied closed-ended questions in

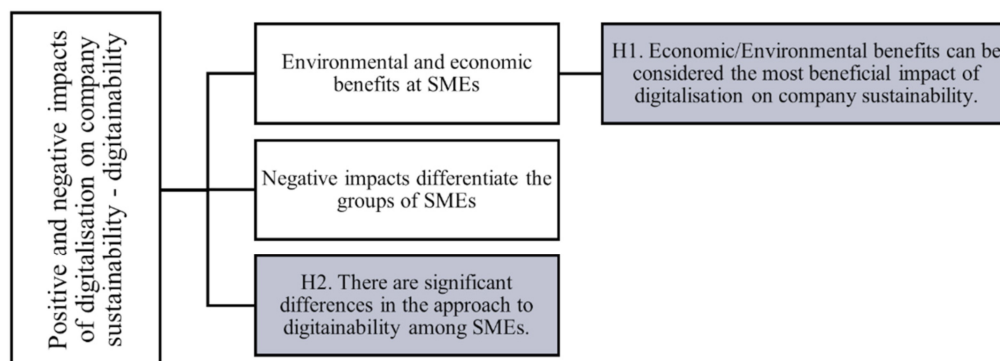


Figure 2. Research design

case of the topic of digitalisation related to sustainability with a five-point Likert-scales. A pilot survey was carried out to confirm the comprehensibility of the questions. Google form was used for the administration of the online questionnaire, which was translated to the native language of the participating countries, and required 10-15 minutes to fill it in. The questionnaire was disseminated among the respective SMEs in September/October 2021. Anonymity was ensured, no personal information was required. The quantitative research used both the online and the paper version of questionnaire. The Serbian project management team collected and merged the responses (634 responses) from the participating countries and shared the combined data with each participating country. For general analyses all the responses were valid, while further analyses required data cleaning. Responses with missing data were dealt with for the specific questions so factor and cluster analyses were carried out on a combined dataset of 625 responses. Due to the non-probabilistic method of data collection the dataset does not give a representative sample but well represents the general state of SMEs' attitude towards digitainability in the V4 countries as well as in Serbia and Bulgaria.

This paper focuses on the questions linked to Sustainability, namely 13 questions – originally 9 asking about the positive and 4 about negative impact of digitalisation on sustainability – and the responses are analysed. Quantitative analysis was conducted using the statistical programme SPSS version 25. After some introductory descriptive analysis on the combined dataset giving a general view of the SMEs' demographic profile and their approach on sustainability, factor and cluster analysis

were carried out to find out what the similarities or differences are in the approach towards digitainability of SMEs in these countries. Independent sample tests were carried out on the clusters to reveal the significant separators between the clusters. Company age, size and the economic sectors are also considered as independent variables for comparison.

## **5. RESULTS**

The results section gives the demographic characteristics of the participating SMEs regardless of the countries, then using the combined data set it checks the reliability and validity of the questions, identifies factors and by the factors it creates clusters to characterise the behaviour of SMEs regarding digitainability. Separating behavioural and attitude differences are identified for the clusters. Company size, age and the dominating sectors SMES operate in are tested whether they make significant differences in attitude and behaviour.

### **5.1. Demographic profile**

A total number of 635 questionnaires were completed by SMEs in the Check Republic, Hungary, Poland, Slovakia, Serbia and Bulgaria, each of which could be used for descriptive measures. Table 1 presents the demographic profile of the responding business professionals and SMEs. First, the personal characteristics of the business professionals surveyed are presented. Two thirds of the respondents are aged between 31 and 60. There are almost twice as many men (62.4%) as women (37.5%) in the sample. In terms of their position, there are almost equal proportions of owners (30.8%),

managers (38.2%) and employees (30.8%).

As shown in the Table 1, in terms of business characteristics the largest proportion is that of micro enterprises (38.3%), Small enterprises give 21.9% of the sample and Medium-sized enterprises (24.1%) make up nearly a quarter of the sample. Large enterprises give 15.1% of the sample, which are also considered for analysis. More than 60% of the enterprises surveyed are more than 11 years old and less than 9% are less than 2 years old. Almost half of the enterprises in the sample are dominated by the Trade sector, one third by the Production sector and 16.4% by the Services sector.

## 5.2. Attitude towards digitalisation and sustainability

As given in the literature review companies think differently about digitalisation and its impact on company sustainability all over the world. Table 2 presents the descriptive measures that characterise the observed SMEs in the Central Eastern European region. The survey

results show that the participating SMEs put the highest importance on *cost and resource reduction, optimisation, higher productivity and less waste*. In each case the Median and the Mode are 4 and 5 respectively (Table 2) and the agreement is large (MEAN>3.7). This is followed by *customised production*, where the average agreement is lower (MEAN=3.66) but still the highest number of SMEs strongly agreed with the statement, and at least half of them agreed. SMEs agreed the least with the extension of product lifecycle (MEAN=3.31, Me=3 and Mo=3) as a benefit of digitalisation concerning sustainability. Half of the SMEs have not integrated SDG goals in their long-term strategies and the highest number seems not to consider it as an important issue (Mo=3). However, as the average of the responses equalled 3.21 in this case, more companies disagreed and have not integrated SDG goals in their long-term strategies. On the drawback side, SMEs rather agree in general that digitalisation *increases the amount of e-waste, speeds up the depletion of natural resources and generates abundant emission* (Me=3, Mo=3 and MEAN>3).

Table 1. Demographic profile of respondents and SMEs<sup>1</sup>

Personal characteristics	Distribution of respondents (%)	n=635	Business characteristics	Distribution of respondents (%)	n=635
<b>Age</b>			<b>SME size (number of employees)</b>		
18-30	23.9	152	Micro enterprise	38.3	243
31-45	36.2	230	Small enterprise	21.9	139
46-60	32.1	204	Medium-sized enterprise	24.1	153
> 61	7.7	49	Large enterprise	15.7	100
<b>Gender</b>			<b>The dominating sector of the company</b>		
Male	62.4	393	Production	35.4	225
Female	37.5	236	Services	16.4	104
I do not wish to answer	0.2	1	Trade	48.3	306
<b>Position</b>			<b>Company age</b>		
The owner	30.8	195	21 years and older	40.8	259
Senior manager	15.8	100	From 11 to 20 years	23.5	149
Manager	22.7	144	From 3 to 5 years	17.6	112
Employee	30.8	195	From 6 to 10 years	9.6	61
			Up to 2 years	8.5	54

<sup>1</sup>Source: All the tables and figures are developed and edited by the authors based on the primary research of entrepreneurial questionnaires

Table 2. Descriptive measures of responses related to digitalisation and sustainability

<i>Digitalising the company helps to...</i>	<b>n</b>	<b>Mean</b>	<b>Me</b>	<b>Mo</b>	<b>IQR</b>	<b>STD</b>
... optimise and reduce the use of resources.	629	<b>3.91</b>	4	<b>5</b>	2	1.129
... reduce costs.	629	<b>3.86</b>	4	<b>5</b>	2	1.155
... adjust the business model to the environmental needs/requirements.	628	3.68	4	4	2	1.188
... reduce carbon emissions.	629	3.36	3	3	2	1.297
... generate value to perform fair business practices to benefit the community and society.	629	3.51	4	3	2	1.229
... extend the lifecycle of our products.	629	3.31	3	3	2	1.303
... relocate funding for green investments.	629	3.33	3	3	1	1.273
... to achieve higher productivity and less waste.	629	<b>3.70</b>	4	<b>5</b>	2	1.190
... to achieve customised production.	628	3.66	4	5	2	1.235
Our company has integrated SDGs into its long-term strategy.	628	3.21	3	3	2	1.350
Electronic equipment and devices produce a high amount of e-waste	629	3.37	3	3	3	1.247
The production and use of ICT consume a growing amount of material, which speeds up the depletion of natural resources.	629	3.22	3	3	2	1.210
The increasing demand for energy supply on digitalisation and data centre generates abundant emissions.	629	3.32	3	3	1	1.185

In order evaluate different approaches of SMES to digitainability in these countries factor and cluster analyses was carried out.

### 5.2.1. Reliability and factors of sustainability statements

No standardized questionnaire was used, it was developed by the researchers from the participating countries. Consequently, the internal reliability of the questions was tested using the Cronbach's Alpha reliability test. According to Taber (2018) different qualitative descriptors are assigned to different Cronbach's alpha throughout research papers. Based on their results, Cronbach's  $\alpha$  values over 0.9 are considered fairly high and high (Taber, 2018). The overall reliability of this study's questions equalled 0.921 (on the standardized question this value was 0.922) — a Cronbach Alpha scale of over 0.9 means that the questions are strongly reliable, see Table 4 (Cortina, 1993). For each question's individual Cronbach  $\alpha > 0.911$ .

Factor analysis was carried out to help

finding SMEs with different approach and attitude to Digitalisation and sustainability, i.e. digitainability. Factor analysis employing the Principal Component method with Oblimin rotation (-0.8) confirmed that the identified digitalisation-related category items (see statements in Table 3) are related, give a reliable framework for the evaluation of the data and also confirmed the pillars of the theoretical framework. Oblimin rotation with delta being -0.8 was used because the factors' correlation was noticeable ( $r > 0.3$ ) indicating a non-orthogonal factor space, that is the factors are not independent from each other. The applied oblimin rotation reduced the correlation to under 0.3 ( $r = 0.252$ ), which satisfies the criteria for the rotation method (Brown, 2009).

Two factors were identified with KMO=0.920, Bartlett's test of Sphericity being significant ( $p = 0.000$ ) and component  $r = 0.252$ ). The factor loadings were over 0.778 for each items, which means strong factor loadings (Table 3).

Given the very general nature (factor loading staying at 0.5 for both factors) of the



Table 3. Identified factors, Factor loadings and item reliability of the two categories

No.		Factor loadings	Cronbach's $\alpha$
<b>Factor 1: positive (+) impact of digitalisation</b>			
Digitalising the company helps to ...			
8	achieve higher productivity and less waste.	0.846	0.912
3	adjust the business model to the environmental needs/requirements.	0.845	0.911
5	generate value to perform fair business practices to benefit the community and society.	0.844	0.912
2	reduce costs.	0.834	0.913
4	reduce carbon emissions.	0.828	0.913
1	optimise and reduce the use of resources.	0.819	0.913
7	relocate funding for green investments.	0.791	0.912
6	extend the lifecycle of our products.	0.791	0.912
9	achieve customised production.	0.787	0.912
<b>Factor 2: negative (-) impact on sustainability</b>			
12	The production and use of ICT consume a growing amount of material, which speeds up the depletion of natural resources.	0.860	0.923
13	The increasing demand for energy supply on digitalisation and data centre generates abundant emissions.	0.854	0.923
11	Electronic equipment and devices produce a high amount of e-waste	0.778	0.922

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

statement ‘*Our company has integrated SDGs into its long-term strategy*’, it was left out from the factor analysis, despite the fact that its reliability is high (Cronbach’s  $\alpha=0.920$ ). Almost 70% (69.949%) of the information was kept; there the two factors identified are: “*positive contribution of digitalisation to company sustainability*” and “*adverse contribution of digitalisation to sustainability*” (see Table 3).

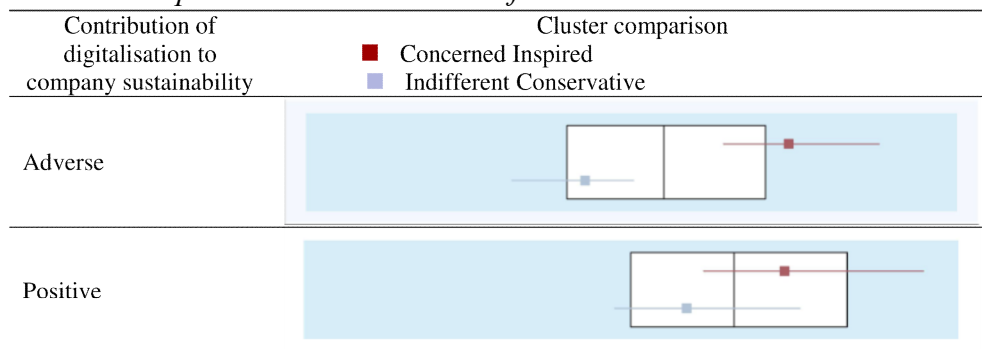
Based on the two factors the participating SMEs were segmented using the Ward and the K-Means methods of clustering. The Ward method segmented two main clusters, and they were identified by the K-Means methods ( $n_1=328$ , and  $n_2=297$ ) along the two factors, one being the **Concerned Inspired** (group 1) and the other comprising of the **Indifferent Conservatives** of digitalisation (group 2) (see Table 4). Concerned Inspired are eager to digitalise and see the process as beneficial but see also the burden on environment and the adverse effect of digitalisation on sustainability. Group 2 –

Indifferent Conservatives do not believe in digitalisation to the same extent as group one and, as a consequence, are more optimist or indifferent on the environmental burden concerning sustainability.

The Concerned Inspired SMEs are the ones according to whom digitalisation helps significantly to *reduce costs, achieve higher productivity and less waste, to give added value to business practices, customise production or helps in optimisation*. Furthermore, these *companies integrate SDGs more in their long-term strategy and adjust their business model to the environmental needs*. These companies seem to be more aware of the negative aspects of digitalisation on company sustainability (cluster centre: 0.4402; -0,4862).

Indifferent Conservatives, on the other hand, put less effort in digitalisation – they are conservatives – , since these SMEs believe less in the positive impact of digitalisation on company sustainability and even their attitude to the negative effects is a

Table 4. Cluster comparison based on the two factors



behaviour of “less concerned” (cluster centre: 0.7031; -0.7765). A medium strong relation and a strong relationship was found between the beneficial and adverse contribution of digitalisation and cluster membership (Cramer’s  $V=0,503$  and Cramer’s  $V=0,825$ , respectively both of them being significant ( $p=0.000$ )).

84.8% of the observed SMEs in the Concerned Inspired group strongly agree with the positive impact of digitalisation on company sustainability while 64.3% of the ones among Indifferent Conservatives rather disagreed with the beneficial impact of a higher rate of digitalisation. On the other hand, 91,8% of Concerned Inspired agree that digitalisation itself brings higher environment pollution, and 67,6% of Indifferent Conservatives think the opposite. 17.8% of the latter group are indifferent concerning sustainability issues while none of the Concerned Inspired SMEs are indifferent. Table 5 presents that SMEs in the group of Concerned Inspired agree or strongly agree with the beneficial effect of digitalisation and agree with the high burden on environment. SMEs in the Indifferent Conservatives do not believe in higher amount of e-waste and abundant emission, and funding of green investment and extension of life cycle are also not their great concern.

**5.2.2. Cluster characteristics on digitainability**

The previous section identified two groups of SMEs. Group 1, Concerned Inspired SMEs find several beneficial impacts such as *higher productivity, less carbon emission, reduce costs, optimisation or adjusting business models to environmental needs*, and at the same being aware of the potential negative results of Digitalisation such as *e-waste, abundant emission or less natural resources*. On the other hand, Group 2, the Indifferent Conservatives, either *has not digitalised their business to a great extent* – might be because of lack of funding, lack of experience, or a conscious decision from the management –, and do not harvest the beneficial results of digitalisation or does not consider the sustainability issues as grave as they are considered globally in the 21<sup>st</sup> century. Figure 3 visually presents the average value of responses given by the participating SMEs in the Central Eastern European Region.

Examining the responding SMEs in terms of the dominating sector of the company, the company age and size, no significant differences could be detected, implying that these characteristics have no influence on the SMEs behaviour and attitude toward

Table 5. Descriptive characteristics of the clusters

Cluster Number of Case 2 clusters KMeans	Concerned Inspired (n=328)					Indifferent Conservative (n=297)				
	Mean	Me	Mo	IQR	STD	Mean	Me	Mo	IQR	STD
<i>Digitalising the company helps to ...</i>										
...optimise and reduce the use of resources.	4.33	5	5	1	0.872	3.46	4	4	1	1.196
...reduce costs.	4.22	5	5	1	0.954	3.47	4	3	2	1.228
...adjust the business model to the environmental needs/requirements.	4.14	4	5	1	0.984	3.19	3	3	2	1.191
...reduce carbon emissions.	3.80	4	5	2	1.196	<b>2.88</b>	3	3	2	1.227
...generate value to perform fair business practices to benefit the community and society.	3.98	4	5	2	1.095	3.00	3	3	2	1.155
...extend the lifecycle of our products.	3.82	4	5	2	1.201	<b>2.74</b>	3	3	1	1.167
...relocate funding for green investments.	3.86	4	5	2	1.157	<b>2.74</b>	3	3	1	1.128
...achieve higher productivity and less waste.	4.11	4	5	1	1.009	3.25	3	3	2	1.208
...achieve customised production.	4.16	4	5	1	1.041	3.10	3	3	2	1.199
Our company has integrated SDGs into its long-term strategy.	3.61	4	5	2	1.347	2.80	3	3	2	1.210
Electronic equipment and devices produce a high amount of e-waste	4.20	4	5	1	0.880	2.49	3	3	1	0.927
The production and use of ICT consume a growing number of materials, which speeds up the depletion of natural resources.	3.98	4	5	2	0.915	2.39	2	3	1	0.902
The increasing demand for energy supply on digitalisation and data centre generates abundant emissions.	4.07	4	4	2	0.868	2.51	3	3	1	0.916

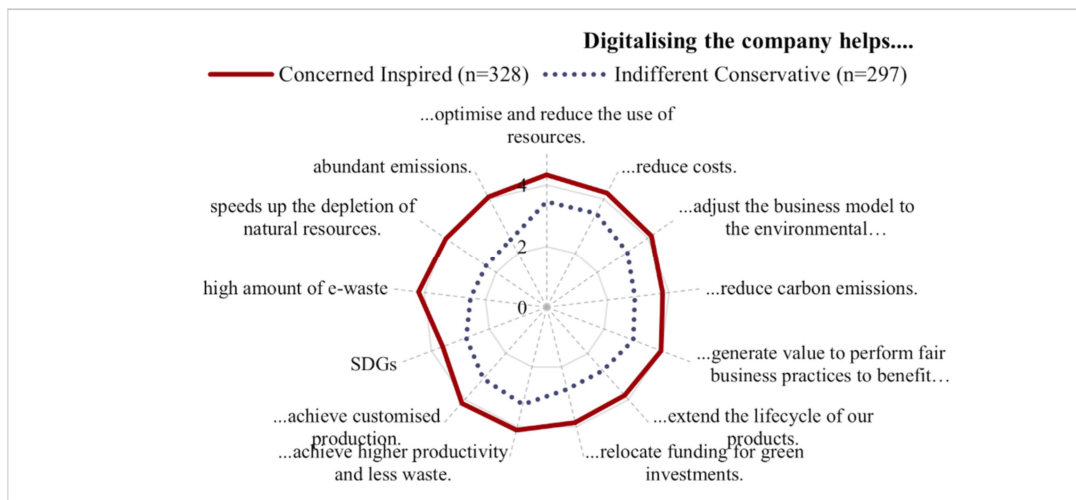


Figure 3. Average value of responses by the two clusters

digitalisation and sustainability. SMEs are evenly distributed in the two clusters by the dominating sectors and size.

Two-thirds of the SMEs (63%) operating up to 2 years (very young businesses) belong to the Concerned Inspired group while older

SMEs are approximately balanced between the two groups. Young SMEs are probably highly eager to digitalise and are aware of the sustainability problems. The older the companies their share in the two groups are more balanced, showing a 43.4% proportion of SMEs being older than 21 years in the group of Indifferent Conservatives.

The results show that there is a significant difference in the perception of digitalisation and sustainability between SME managers and owners, which also indicates the need for specific strategic initiatives for their further development. It is not dependant on whether SMEs operate in production, trade or services, a young enterprise or a mature company or even a micro or a medium-sized company. Despite the question on SDG goals was not used for segmentation, there is a significant difference between the two groups ( $p=0.000$ ) regarding the question. SMEs in cluster 1 has rather integrated SDGs (Mean=3.61, Mo=5 and Me=4) while SMEs in cluster 1 has rather not integrated SDGs (Mean=2.8, Me=2 and Mo=2) which also strengthens the status of the two clusters.

## 6. DISCUSSION

The aim of this study was to analyse the perceptions of SME owners and managers on the relationship between digitalisation and sustainability. The research results confirmed that the surveyed SMEs have a realistic perception of the contradictions of the two trends, and the results obtained for each topic (such as productivity improvements, cost and raw material consumption, etc.) (Gregori & Holzmann, 2020; Gupta et al., 2020; Acciarini et al., 2021) tend to confirm the respondent's knowledge of both the benefits and negative effects of digitalisation. The

first hypothesis, according to which

**H1.** Economic/Environmental benefits can be considered the most beneficial impact of digitalisation on company sustainability, can be considered partially confirmed. The results of the research show that the most important benefits for the SMEs surveyed are *cost savings, raw material reduction and optimisation, increased productivity and the less waste*. At the same time, all but one of the perceived benefits are economic in nature, while several environmental factors (increase of e-waste, threats to natural resources) are rather highlighted in terms of burdens of digitalisation.

A key finding of the research is that it confirms that SMEs are hardly open to sustainable business models (Zamfir et al., 2017), and have little environmental orientation (Denicolai et al., 2021), given that more than half of the firms have not integrated SDG goals into their long-term strategy and do not consider it to be particularly important. Nevertheless, in the light of the results, hypothesis number two, that

**H2.** There are significant differences in the approach to digitainability among SMEs, proved to be true, as the research revealed two groups with different views on digitalisation and sustainability. The group of **Concerned Inspired** believes in the positive benefits of digitalisation but are also more concerned about its negative impacts at the same time, while the **Indifferent Conservatives** are generally more sceptical about digitalisation and its environmental, economic and social burdens. Accepting that the path to growth and catching up for SMEs is digitalisation and sustainability (Bai et al., 2021), firms in the above segments may achieve this through different strategies, in

the line with the beliefs of their owners and managers. For the group of Concerned Inspired, sustainable entrepreneurship (Gregori & Holzmann, 2020) may be a desirable development path, by embedding digital technologies in their business models to foster socioenvironmental value creation. This business model requires the selective use of digital technologies, ultimately offering a balanced value proposition for the stakeholders. For the Indifferent Conservatives, cost reduction may be a call to action, which may encourage these entrepreneurs to incorporate business models (Acciarini et al., 2021) that support digitalisation in particular. Empowering balanced digitainability for SMEs does not seem feasible in one step. The entrepreneurial attitudes identified in the present research and the lack of resources do not allow it, whilst however the effectiveness of this strategy, the simultaneous implementation of the two orientations (sustainability and digitalisation) also is

questioned by a number of scholars (Park, 2018). Based on the above, the strategies described in Figure 4 emerge.

### 7. CONCLUSION

The question of the competitiveness of SMEs is a continuous challenge for the academic community. It is generally agreed that the business success of these firms has a significant impact on the economic performance of individual countries. In this study, we have sought to identify appropriate strategic directions adapted to the specificities of SMEs along the two megatrends of digitalisation and sustainability. This paper has sought to identify the appropriate strategic directions for SMEs along the two megatrends of digitalisation and sustainability. The empirical research examined the perceived effect of digitalisation on sustainability among SMEs in the V4 countries, Bulgaria

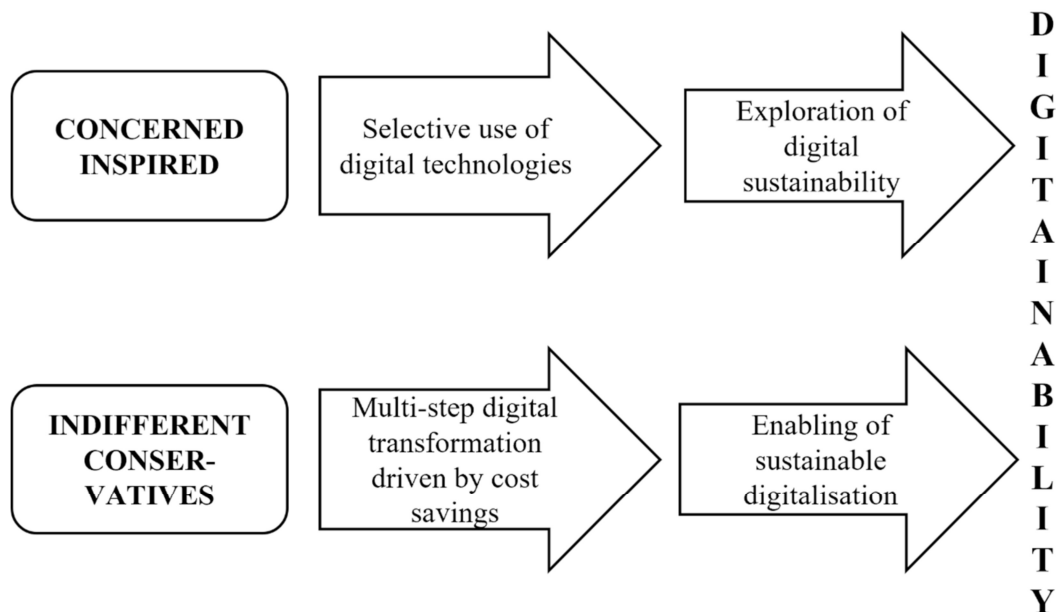


Figure 4. Participating SMEs' business strategies towards digitainability

and Serbia. Based on the results, two groups of SMEs emerged, for which two development orientations were identified, based on the preferences of the management.

In addition to the results, the limitations are also important to note. The research sample is not representative, so the findings of the research cannot be generalised, but the size and composition of the sample make the results noteworthy. It is also to be mentioned that the digitainability matrix framework used in the study did not clearly indicate the criteria (orientation, digital maturity, etc.) by which the enterprises could be characterised, and their position defined. The empirical research, on the other hand, mainly explored the relationship between the two trends and did not directly examine the digital and environmental/sustainability orientation or state of the individual enterprises, thus only partially aligning with the digitainability framework. For more precise results, it would be important to further refine the candidate framework and to investigate its practical applicability in detail, which, given the originality and novelty of the theory, is expected to be done in the near future.

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## СВЕСНИ ИЛИ РАВНОДУШНИ – ЗАБРИНОСТ О ДИГИТАЛИЗАЦИЈИ И ОДРЖИВОСТИ МЕЂУ МСП У ИНДУСТРИЈИ 4.0

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### Извод

Позитивне предности дигитализације данас су генерално препознате и признате од стране компанија и обично се виде као суштинске у пословном окружењу које се брзо и стално мења. Ипак, ниво дигитализације је и даље испод очекивања, посебно међу малим и средњим предузећима. Неколико фактора стоји иза тога, у распону од бриге о високим трошковима и стилова управљања до недостатка знања итд. Ова студија разматра један од ових аспеката, контрадикторни однос између дигитализације и одрживости, са циљем да се истражи потенцијал дигитализације у будућност и изношење нових стратегија развоја за мале организације.

Ово истраживање указује на уочени утицај дигитализације на одрживост, на основу мишљења власника и менаџера малих и средњих предузећа у земљама В4, Бугарској и Србији, користећи квантитативну методу путем анкете. На основу њихове перцепције о овој теми, анкетирани организације се могу поделити у две групе (забринуте инспирисани, равнодушни конзервативци) и сходно томе могу постићи стање уравнотежене дигитализације, где су и одрживост и перформансе дигитализације изванредне са различитим стратешким корацима.

*Кључне речи:* могућност дигитализације, дигитализација, МСП, одрживост, СДГ, земље Вишеградске четворке, Србија, Бугарска

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