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Abstract: The pandemic crisis has meant a challenge for SMEs and a factor that can change the way of doing business. The current paper analyses the correlations between financial resources, turnover, sustainability, and digital technologies and how these components can be adapted to changes in the economy triggered by the pandemic crisis in the structure of activities carried out by SMEs. Resting on the importance of integrating the innovative, digital component to the activities of SMEs, in close connection with the financial resources component, a multicriteria research model for business has been developed, assessing the correlations between key variables and their influence on European SMEs. In order to fully define the concepts envisaged and to emphasise these correlations, multiple linear regression, clustering techniques, and correlation analysis were used. In the end, the proposed solution provided a common language through which companies can evaluate traditional processes and bring together the research components into business activities.

Keywords: sustainability; funding; turnover; digital technologies; SMEs; research model

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1. Introduction

The changes caused by the pandemic crisis have seriously affected economies and the business environment, with the small and medium-sized enterprises (SMEs) tackling new problems and vulnerabilities [1]. Indeed, the crisis has sharpened the difficulties faced by SMEs generated by globalization and by the existing conditions on domestic markets, increased competition, access to financing resources, the existence of bureaucratic and legislative barriers, and internal weakness linked to human and managerial resources [2,3]. Restrictive measures to combat the pandemic have affected the supply and demand segments, leading to a diminished production capacity, disruption of supply chains, and lack of financial, human, and material resources [4,5]. On the other hand, a dramatic drop in income has led to a lack of cash flow, with SMEs facing challenges in accessing funding sources and being more vulnerable to "social distancing" than other types of companies [6,7]. The crisis has also generated the opportunity to rethink the economy and society [8], boosting the key trends: innovation, digitalization, sustainability, and flexibility [9,10]. The COVID-19 context highlighted the need to adapt to the new economic and social reality, rethink companies' business strategy, and create new business models,

sustainability playing a decisive role in redefining long-term priorities [11,12]. At the same time, the latest Flash Eurobarometer [13,14] on SMEs, published in September 2020, spreads broad concerns: 70% of EU SMEs face at least one obstacle to becoming sustainable (combining long-term economic and financial performance with a positive impact on the society and the environment) [1].

In the context of limiting access to resources, ecosystem degradation, and climate change, traditional business models are no longer sustainable [15]. Therefore, the transition to sustainable development needs the involvement of SMEs as playing a vital role in the business ecosystems. At the same time, the long-term success of SMEs cannot be achieved without integrating the components of sustainable development into the business strategies of SMEs [16–18].

SMEs play a central role in economic processes at the European level, making a significant contribution to the economic growth (over 50% of the GDP at the European level), to the creation of new jobs, to increase competitiveness in various fields of activity and to the expansion of innovation in all regions of Europe [19]. Moreover, due to their collective impact and the role of suppliers for large companies, the SME sector has the power to initiate industry-wide changes towards a sustainable and digitalized economy [20–22]. Under these circumstances, business development trends must be considered on a new, innovative basis, using state-of-the-art technologies, with innovation as the condition enabling firms to achieve resilience [23–25].

Such an approach is closely correlated with the Industry 4.0 (I4.0) approach, which aims to transform industrial production through digitalization and exploit the potential of new technologies [26]. The I4.0 revolution incorporates innovative, interconnected technologies using data analytics, artificial intelligence, cognitive technologies, and the Internet of Things (IoT) to create digital, sustainable businesses that meet the new standards set by an ever-changing marketplace. The challenges and opportunities triggered by Industry 4.0 must be examined for SMEs in particular, thus paving the way for the digital transformation of traditional SMEs into smart factories, with advantages such as cost reduction, flexibility, and integration, improved productivity and quality, reduced delivery time, and strengthened competitiveness [27–30]. At a higher level, the elements relevant to Industry 5.0 are limited to the European Commission's significant initiatives envisaging: a human-centered approach to digital technologies, including artificial intelligence; training and retraining of European workers with a focus on digital skills; ensuring modern, resource-efficient and sustainable industries and the transition to a circular economy (Green Deal) as well as a globally competitive industry, accelerating investment in research and innovation [31]. In all these stages, SMEs have benefited from the support of the European Union (EU), which adopted numerous legislative initiatives and promoted various programs and projects to support the SME sector (a benchmark is the adoption of the Small Business Act in 2008). The strategy set out in the Small Business Act for Europe aims to support SMEs in several areas such as internationalization, access to finance, environmental protection, increasing competitiveness, and innovation.

The innovation component acquires new meanings in the context generated by the pandemic, based on the need to adapt to digital activities [32–34]. Currently, businesses are facing a unique transformation, and the crisis has meant a challenge for SMEs and a factor that can drive a significant change. Digital transformation requires rapid adaptation and flexibility to respond quickly to market and customer requirements. It involves several stages, starting from changing mindsets, establishing a business strategy on a sustainable basis, adapting skills, attracting additional financial resources, and a process of permanent adaptation to new technologies. In the new economic climate, an innovative approach, with the integration of digital technologies and adequate financial resources, can ensure the sustainable development of SMEs [9,10,35,36].

Drawing from these premises, the current paper is intended to analyze the correlations between the main components—financial resources, turnover, sustainability, and digital technologies. Moreover, it aims to determine how these components can be adapted to

changes in the economy generated by the pandemic crisis, based on the assumption that pursuing profitable activities depends on an innovative, sustainable business. Analyzing the importance of integrating the innovative, digital component to the activity of SMEs, in close correlation with the new trends imposed by the Industry 4.0 and 5.0 revolutions and by the financial resources component, a multicriteria research model for business will be developed.

Although there is no standard model accepted and adopted by all SMEs, the proposed research model will cover the current research gap and provide a common language to evaluate traditional processes and bring innovation into their daily activities. The study is based on a statistical analysis of EU SMEs' data supplied by the Flash Eurobarometer 486 [13,14]. Considering the survey data, we proposed a research model for SMEs, which was developed based on critical elements: funding, turnover, sustainability, and digital technologies, which is a new approach in the literature.

Moreover, the elements that define the research model in the new context are interrelated: funding (in terms of opportunities and capacities), turnover (as an indicator of organizational performance), sustainability, and digital technologies, and recognizing their role can be a premise for business success in the digital age. The study's innovative feature consists of analyzing the critical elements in intercorrelation, unlike studies that have looked at them separately. This innovative nature enables SMEs to implement the new complex research structure envisioned by the research model that will allow them to adapt their processes to the new economic circumstances based on sustainability and digitalization. The analysis is done considering the context of the pandemic crisis, which was unprecedented and generated new challenges and up-to-date solutions for supporting their business. Therefore, the study's novelty is determined in a certain measure by the novelty of the situation the SMEs were confronted with in that period and further. In this regard, empirical research is still quite scant. Paying specific attention to SMEs, the study contributes to nurture the limited body of empirical works on the effects of the pandemic on SMEs and to fill in the lack for an integrated approach capable of jointly considering the relations among funding, turnover, sustainability and digitalization.

Accordingly, we formulated the following research questions:

RQ1. What is the causal relationship between the components that are the object of the research model for business, represented by funding-turnover and sustainability?
RQ2. What is the causal relationship between the variables represented by funding turnover and digital technologies?
RQ3. What are the solutions to integrating sustainability components and digital technologies to the structure of activities and processes carried out within SMEs?

The remainder of the article is organized in a logical flow of sections to articulate the answers to the research questions. Section 2 provides a detailed review of the mainstream literature on SMEs' vulnerability in the pandemic scenario, addressing the topics that present the foundation of the research (crisis, innovation, digitalization, sustainability, and funding). Section 3 introduces the research objective and presents the research model and the methods. In Section 4, the research findings are presented and discussed, validating or invalidating the hypotheses, using the regression and the prediction functions. A multicriteria clusterization has been used to reveal the concordance between countries with high financing parameters and those reporting higher technology and sustainable development levels. In the final section, the theoretical and practical implications of the study are presented, along with limitations and future research directions. From the conceptualization point of the research model, the article focused on highlighting the innovative character and the importance that the model, once created, can have both at the theoretical level and, especially, practically. Thus, the model manages to bring together critical elements of great importance in the current period, whose impact on the activity of SMEs will be found in their medium and long-term activities and objectives.

2. Review of the Mainstream Literature

2.1. The Pandemic Crisis and SMEs' Vulnerability

The pandemic crisis has changed the world as a whole. It has changed priorities and mindsets, the impact on economic life being a major one. As an integral part of the economic system, the SMEs sector has undergone this process of transformation, challenge, and revaluation [37].

There are several ways in which the COVID-19 pandemic has affected the economy, especially SMEs, both in terms of demand and supply [4,38–40]. Regarding supply, the effects were felt in the use of the production capacity [41], in the labor force [4,42], in difficulties related to transport, logistics [43], and in enterprise supply chains [7,44,45]. Moreover, the problems related to the lack of financial resources were accentuated [46], and SMEs faced a cash flow crisis [47,48]. In terms of demand, SMEs have experienced a sharp decline in revenues as a result of the measures imposed by the pandemic that affected their ability to operate, and as a result of reduced customer confidence [49], a high degree of uncertainty [4], and disruptions of global value chains [43].

SMEs are more vulnerable (compared to large companies) during economic and financial recession periods, the causes being represented by their characteristics [50]: the difficulty of restructuring or downsizing; low degree of diversification of activities; more fragile financial structure; dependence on external sources of funding [7,37,51]. In addition, the pandemic crisis has exacerbated these vulnerabilities, with SMEs reacting late to the challenges, the causes being limited resources—in particular, scarcity of financial resources and low cash buffer [52,53]—gaps in expertise, and vulnerabilities in customer and supplier relationships [54–56].

Business literature has pointed out that SMEs' difficulties in facing the effects of economic crises [57] rest on the lack of financial resources and the high cost of capital and the scarcity of administrative and technical capabilities [58].

The pandemic crisis exacerbated the difficulties faced by the SMEs. Moreover, it determined the need to re-evaluate this sector given the place and the role it plays in the European economy, being deeply integrated into the economic and social structure of Europe: SMEs represent 99.8% out of the total number of companies, provide 65% of the jobs and generate 53% of the added value [19,59]. On the other hand, despite vulnerabilities, SMEs are more flexible and adaptable than large firms (features that can allow them to respond appropriately and quickly in times of crisis) due to their size, type of ownership and hierarchical structures, proximity to decision makers by customers and other stakeholders, which allows valuable market information to be obtained [43,60,61]. In addition, the pandemic has given rise to business opportunities in certain areas (e-commerce, deliveries, and mobile applications) with a solid technological character. At the same time, the pandemic has produced significant changes in consumer behavior, one of which is the increased focus on online commerce. Therefore, companies need to adapt to these changes (which are likely to be irreversible) to propose a new value offer based on innovative technological solutions through investments in digitalization [62].

In order to meet the challenges posed by the COVID-19 crisis and take advantage of the opportunities that have arisen during this period, SMEs need to be more resilient [63]. The resilience of an SME involves creativity and innovation (as entrepreneurial skills) to meet the needs of customers and trends on the market [15,25,33,34,64–66]. However, the resilience of an enterprise is conditioned by the resilience of its ecosystems [60]. Consequently, government support and public policies are crucial for the resilience of SMEs in order for the generalization of new technologies at their level to stimulate their sustainable growth [67], for the generalization of new digital technologies, and the application of various innovative tools of the fourth industrial revolution [68].

2.2. Orientation towards Digitalization of SMEs in the Context of the COVID-19 Pandemic

The restrictions imposed by the pandemic have also accelerated structural changes in the way of conducting business on a new, digital basis [69]. Under these new circumstances,

the challenge for SMEs will be to bridge the gaps generated by the crisis and adapt to the new economic realities [70]. Thus, SMEs can use the fast-growing digital sectors for sustainable development by adapting their business strategy.

Digitization involves using modern technologies to create value by replacing traditional business processes and creating a digital business environment. The digital transformation means not only the adoption of new technologies but also the achievement of organizational, operational, and cultural changes in companies as a result of the use of Information and Communication Technologies (ICT) [71] and the use of digital skills at all levels of the organization [72].

The sustainability and digitalization strategy is, in fact, based on the foundations of the policy of supporting SMEs at the European level through numerous actions, such as the Small Business Act adopted in 2008 but also the Start-up and Scale-up initiatives of 2016 or the framework programs: Competitiveness for Small and Medium-sized Enterprises (COSME), Horizon 2020, Entrepreneurship 2020 and investments from European Structural Funds to create an ecosystem conductive to innovation and development in the SME sector [73]. The new industrial strategy for Europe developed in 2020 is based on three pillars—global competition, climate neutrality, and the digital future—to support companies' long-term development, increase their competitiveness, and create a single digital market. The Digitizing European Industry (DEI) initiative was also launched under the Digital Single Market package in April 2016. Recently, the European Parliament established a financial package for the period 2021–2027 under the Digital Europe Programme [74], supporting the development of critical areas such as artificial intelligence, high-performance computing (HPC), cyber security, blockchain, or advanced digital skills [75]. Another vital pillar of the Digitizing European Industry policy is the network of Digital Innovation Hubs (DIHs) and European Digital Innovation Hubs (EDIHs), which support companies to become more competitive through the use of digital technologies [76]. Furthermore, digital innovation centers will play a key role in achieving the goals set out in the Digital Europe Programme, stimulating the widespread use of new technologies in an ecosystem with an adequate level of cyber security and conducive to digital innovation and development [75]. These European initiatives emphasize the importance of the digital transition in the context of the economic recovery from the crisis caused by the COVID-19 pandemic, reiterating the need for digital investment [75] in SMEs (only 20% of all SMEs show a degree of high digitalization) [77].

The widespread application of digital technologies in the business of SMEs, seen as a new opportunity for Europe, is closely correlated with the Industry 4.0 and 5.0 revolution. Thus, the incorporation of new technologies (artificial intelligence—AI, blockchain, Internet of Things—IoT, high-performance computing, cloud) [78] can lead to increased business efficiency by optimizing all stages of the life cycle of products [79] to an increased innovation capacity and competitiveness of new enterprises on a sustainable basis [43]. Furthermore, emerging digital technologies allow for more significant product differentiation, for better-integrated systems in the supply chain, and, in general, they can lead to digitally improved businesses that make better use of distance and time to market. Digitalization also supports open sourcing and innovation, offers a wide range of financial services to SMEs, fostering the expansion of activities abroad, incorporating new knowledge, capitalizing on the benefits of emerging markets, and new opportunities to participate in the global market [80]. Achieving these objectives requires understanding business values correlated with new technological solutions and the concept of digitalizing production and adopting systems that correspond to the paradigms of Industry 4.0 and, at a higher level, of Industry 5.0, which integrates the ecological component. However, the implementation and effects of the introduction of Industry 4.0 components in SMEs have not been sufficiently investigated in the literature, the 4.0 SME project being the only initiative that addresses these issues in a complex vision, internationally and with all components [78]. In the current context, such an analysis is necessary, given that innovation is key to addressing global challenges such as sustainability, resource efficiency, increasing productivity, and competitiveness.

An additional argument is that, in pandemic conditions, digitalization can differentiate the SMEs surviving the crisis [81]. The digital transformation of SMEs involves efforts and actions on their part, but also on the part of public authorities. The role of government authorities may consist of various actions to promote and raise awareness of the importance of digital transformation, involvement in training a competent workforce, technical and financial assistance for SMEs, strengthening specific ICT infrastructure [81,82].

A reaction often adopted by many SMEs to prevent future disruptions in the supply chain is to focus on building inventory [83]. However, research conducted with a managerial approach and focused on how SMEs are tackling the effects of pandemic to ensure business performance have generally analysed such features separately. In this vein, exploring the use of digital technology, Guo et al. [84] highlighted the importance of digitalization for enhancing SMEs' responses to the pandemic crisis. Gerald et al. [85] argued that improving agility capabilities allows SMEs' capacity to mitigate the negative effects over company's performance. Moreover, Omar et al.'s [86] study addressed the use of financial and marketing strategies to overcome the crisis and that SMEs pursued long-term rather than short-term strategy to achieve sustainable performance.

2.3. The Focus of Sustainability in SMEs

A considerable stream of scholarly research has emerged in the literature, suggesting that corporate social responsibility and sustainability orientation is the key to stimulating long-term stability, growth, and sustainable performance in a dynamic and changing environment [16]. A careful observation of the current trends, corroborated by the evidence drawn from numerous studies, highlights as strategic directions investments in sustainability, digital transformation, and human capital. Integrating corporate social responsibility and sustainability [87] into the corporate value proposition benefits society and boosts competitive advantage.

In order to remain competitive in today's business environment, new strategies and practices are required, with sustainability playing a central role in setting priorities. 'Shared value' can be created by redefining and innovating products, markets, value chains, and connections among business, government, and civil society [88]. These priorities are also reflected in the strategy for SMEs developed by the European Commission for a Sustainable and Digital Europe [80]. The strategy aims to capitalize on the potential of European SMEs to make the double transition to sustainable business practices and digital technologies. Therefore, the overall digital performance of Europe and SMEs is monitored using the Digital Economy and Society Index (DESI) [89].

Closely related to digitalization, sustainability is a shaping force of economic progress at the European level. The sustainability strategy for SMEs at the European level was founded on numerous policies and actions, such as the Small Business Act (2008) and Start-up and Scale-up initiatives of 2016 [73].

The SME sector is at the heart of this process, proving a flexible, dynamic, innovative sector committed to sustainable activities specific to the circular economy [8,90]. A positive relationship between SMEs' sustainable behaviour and their economic, financial and competitive performance is confirmed by the literature, grounding on several theoretical approaches, namely on stakeholder theory that has emerged as a fundamental pillar pointing out the company stakeholder responsibility [91] and extending stakeholder approach to value creation businesses [92,93]. Recent studies have stressed the need for a consistent system of variables and the definition of appropriate causal relationships to conceptualize the linkages between corporate performance and the process of sustainable value creation [92]. Efforts devoted to corporate sustainability can promote superior corporate performance through several drivers, such as accountability, transparency, commitment, trust, reputation, innovation, efficiency, or license to operate [94–97]. Moreover, the relationship between sustainability and productivity has been proven [98].

However, some elements and characteristics prevent SMEs from implementing sustainable development strategies, such as limited financial and human resources, organizational

structure, lack of an adequate knowledge base and skills, and lack of incentives from governments or the market. In the current context, the pressure for companies to respond to problems related to sustainable development in the face of economic crises, lack of financial, material, and energy resources, or environmental requirements can also be seen as an opportunity to re-orient SMEs towards innovation based on sustainability [99–101].

Attaining sustainability is one of the business goals that most of SMEs settle up from the beginning and strive to achieve throughout their operations. Sustainability is seen as generating value for consumers, businesses, and stakeholders [102] via social capital and engagement [103]. Within the above theoretical context, many authors have considered the role of corporate responsibility as fostering the accumulation of social capital [104,105], particularly in SMEs and in family firms [103] leveraging on trust and reciprocity norms, relational networks, and relational competences. Social capital—composed of structured, cognitive and relational dimensions—affects interfirm resource exchange and learning, the creation of intellectual capital, supplier interactions, and product innovation [106]. A number of authors have addressed the relationship between corporate social responsibility and social capital in SMEs, linking CSR with the attainment of competitive advantage or financial success [107,108].

The primary problem is that SMEs attempting to achieve sustainability would benefit from adopting a systems approach, which will allow us to incorporate it into the firm's strategy [109]. However, embedding sustainability into the SMEs development strategy is not easy [110], because there are some obstacles to overcome that SMEs that follow this route face, such as worry, as they are more likely to face institutional barriers than some other types of entrepreneurs [111], to deal with their stakeholders, or to face personal failure [112].

2.4. Financial Resources and Turnover

In order to achieve the objectives related to innovation, digital technologies, and sustainability, funding sources and their degree of accessibility should be taken into account. An essential financial indicator, which should be incorporated in the analysis of the economic performance of a company, is the turnover, which expresses the production and the revenues from the sale of goods, in essence, the potential for capitalization of the products and services on the market by the SMEs. The pandemic crisis has had a significant impact on the turnover of SMEs, resulting in lower sales figures. In addition, supply chain disruptions, late payments, and loss-making operations have been the key challenges many SMEs faced in 2020 [19].

On the other hand, access to funding sources has been considered one of the main obstacles identified by SMEs on the way to business development [73,113–115], and this aspect has been exacerbated by the current pandemic crisis [116]. In addition, the correlation between funding sources and innovation is relevant [117,118]. Thus, mainstream literature analyzes the ever more difficult access of innovative companies to finance [119,120] and the importance of financing in supporting innovation [121,122]. However, it must be acknowledged that the current crisis provides the opportunity to build a greener, more sustainable future by addressing the world's key challenges and seeking solutions to climate change. In this context, sustainable financing is becoming a fast-growing investment tool in various countries as it promotes investments based on sustainable business models and social and environmental projects [123]. Therefore, governments and financial institutions need to find new ways to work together to support financing models that encourage small and medium-sized enterprises to adapt their production processes to sustainable financing sources [124,125]. These actions can enhance sustainability standards in global value chains and ensure sustainable performance [126].

3. Research Methodology

3.1. The Research Objective

The current research aims to develop a research model for businesses to assess the correlations between the key variables—financing, turnover, sustainability, and digital

technologies—and identify solutions to include the components of sustainability and digital technologies in the structure of the activities carried out by SMEs. Approaching the concepts of sustainability and digital technologies in the new international context involves assessing and redefining the correlations between the essential variables of the SME activity, the financial component being the critical element of this analysis. Accordingly, from the perspective of SMEs, their characteristics and their ability to adopt innovative, digital components must be taken into account. SMEs face a technological lag, a lack of financial resources, labor shortage, lack of skills to achieve the process of digital transformation, alongside reluctance to data protection and security [80]. Under these circumstances, SMEs face the challenge of incorporating both the innovative, digital, and sustainability components into their business, thus trying to ensure the long-term development of the business. However, this approach must also consider the financial component, represented by funding sources and turnover.

3.2. Data and Variables

Based on extant research, the authors noted that no economic models that bring together, within the same structure, the variables represented by funding, turnover, sustainability, and digital technologies had been identified or built so far. On this basis, using and adapting the deductive approach of Saunders et al. [127], the conceptual framework of the research was built, aimed to identify answers to the questions posed and, finally, to draw up a model that integrates the components of digital technologies and sustainability at the level of SMEs. The study area covered 12,343 SMEs in 27 EU Member States, which from February to May 2020, amid an unprecedented health crisis affecting all areas of activity, were selected to participate in a survey—Flash Eurobarometer 486 [13,14]—commissioned by the European Commission and conducted by Kantar [14]. The data were based on primary sources, represented by the information made available by Kantar and provided by the SMEs involved in the research. According to the information gathered from Flash Eurobarometer 486 [13,14], the sample was selected from an international database, represented by Bureau van Dyke (ORBIS) and Dun and Bradstreet, with additional samples from local sources. In addition, interviews were conducted with key company decision makers over the telephone, using the TNS e-call center. In order to ensure a good representation of different sector groups in each country, the sample was drawn following the distribution of companies in the selected countries. Using this method, it was assumed that the sector distribution would thus fall out naturally. It should be mentioned that the survey results are estimations, their accuracy resting upon the sample size and the observed percentage. Thus, for the sample of 500 companies/countries and an observed percentage of 50%, a confidence interval of 4.4% (45.6–54.4%) was accepted at the 95% confidence level.

The research used multiple linear regression, clustering techniques, and correlation analysis, all implemented and applied to fully define the concepts envisaged and to capture the correlations between variables and influences between the different dimensions of the correlation between the key elements: funding, turnover, sustainability, digital technologies. The research was grounded as follows:

- a first step was collecting initial statistical data (results), based on which the analysis was performed, presented in the form of answers (represented by the number of SMEs) to questions specific to the evaluation of different criteria, then grouped into study variables [14]. In Table 1 below, a detailed structure of the study variables, specific item, significance of each item selected in the research and its specific measure is presented.

Table 1. Variables, criteria, and their significance.

Variables	Item	Significance of Item	Measure
Turnover	Q4	turnover in 2019	Annual turnover of the company in 2019
	Q5.2.	increase in turnover between 2016–2020	Growth of the company since 2016 to 2020 with regard to the turnover
	Q6.2.	the estimated increase in turnover	The company's growth forecast per year in terms of turnover
Financing	Q10	the company's ability to obtain external financing	Confidence in being able to obtain future external financing if needed
	Q16.2.	assessment of the business environment from the perspective of access to funding sources	The assess of the business environment according to the access to private and public funding
Sustainability	Q16.6.	assessment of the business environment from the perspective of the capacity to support the transformation into a sustainable company	Assessing the business environment in terms of availability of support to help businesses become more sustainable
	Q25	existence of a strategy or action plan for the transformation into a sustainable company	Existence of a strategy or action plan that combines long-term success and profitability with a positive impact on society and the environment
Digital technologies	Q16.8.	assessment of the business environment from the perspective of the company's technology infrastructure	Assessing business environment in terms of infrastructure for businesses, such as available office space, internet connectivity
	Q22	the approach of digital technologies by the company	Options that describe the company's approach to digital technologies: adopting core digital technologies; the adoption of advanced digital technologies, but without the knowledge, skills or funding to adopt them; adoption of advanced digital technologies in the near future; adoption of currently advanced digital technologies; not adopting any digital technology.

Source: developed by authors.

- for a systematic analysis, these data were then adapted in two stages: (i) assigning quantitative levels to qualitative responses through a Likert-type approach [128]—to this end, a single scale in the range 1–5 was used; and (ii) normalization of the parameters associated with each criterion, depending on the value of the valid answers recorded (answers of the 'Do not know' type and 'No answer' were not considered). Thus, each criterion was evaluated by a unique parameter on a scale between 1 and 5, specific to each analyzed object (Member State)—see Table 2. The evaluation formula involved calculating the weighted average for each variable and country and the average Likert score. Analyzing the way in which the answers were given to each item, we assigned to each answer a quantitative level applying the following ratio depending on the possible answers: the ratio was 1 for the questions with 5 answers, 0.677 for 7-answer questions and 1.33 for 4-answer questions.

Table 2. Criteria and parameters per each analyzed object (country).

Criteria Objects (EU Countries)	Turnover/Financing					Digital Technology		Sustainability	
	Q4	Q5.2	Q6.2	Q10	Q16.2	Q16.8	Q22	Q16.6	Q25
BE	2.646802	3.045814	2.529232	3.801837	3.432586	3.869062	3.116803	3.134028	2.580683
BG	1.361222	2.677335	2.613636	2.888004	3.012178	4.112904	3.141962	2.666851	2.726744
CZ	1.799500	3.194000	2.447873	3.468697	3.175865	3.997618	2.545455	2.652061	2.568654
DK	2.630476	3.230316	2.732046	3.841538	3.310846	3.917011	2.336082	2.957027	2.251392
DE	2.494888	3.268344	2.865449	3.694283	3.404289	3.634380	2.861996	3.054115	2.714759
EE	1.719508	2.899517	2.474659	2.091617	2.836609	4.016926	3.914634	2.636866	2.728715
IE	2.417435	3.187768	2.782748	3.637095	3.598788	3.902279	2.955414	3.426454	2.757247
EL	2.203439	3.137495	2.949172	3.283954	2.788786	3.726653	3.312245	2.848378	3.221822
ES	2.130740	3.059772	2.415427	3.621863	2.942805	3.653797	2.694672	2.631667	2.640685
FR	2.600004	3.010085	2.632018	3.340489	3.155640	3.363470	3.016461	2.848194	2.706208
HR	2.019103	2.879412	2.635641	3.238629	3.292760	4.069128	3.344828	2.741682	2.759979
IT	1.992196	2.545143	1.950606	3.643900	2.889789	3.693656	3.735471	3.070024	2.198640
CY	2.498455	2.821154	2.460829	3.040216	3.149931	4.035269	2.925532	3.207436	2.830374
LV	1.548288	2.765676	2.212363	3.161396	2.799003	3.973851	3.192698	2.627918	2.649897
LT	1.656358	3.155080	2.814030	3.277716	3.073949	3.904407	2.885246	2.848844	2.365010
LU	2.831891	3.102919	2.620615	3.432246	3.569191	3.729105	2.744792	3.261688	2.823333
HU	1.870995	3.337143	2.524419	4.019854	2.722656	4.019401	2.631048	2.634640	2.461466
MT	2.176435	3.026489	2.219322	3.488105	3.654583	4.141398	3.109948	3.655000	2.780423
NL	2.844226	3.370887	2.930323	3.919264	3.420890	3.810977	3.144958	3.336005	2.797463
AT	2.658232	3.314678	2.790579	3.923421	3.604324	4.007484	3.078059	3.188016	2.897886
PL	2.186547	3.155957	2.790725	3.651780	2.865609	3.786282	3.082816	2.539030	2.518351
PT	1.905675	3.197155	2.809656	3.912749	3.595711	3.856429	2.881988	3.520843	3.045031
RO	1.675432	3.007757	3.115022	2.852790	3.026698	3.635742	2.260593	3.146614	2.771145
SI	2.131895	3.305781	2.582552	3.828689	3.497664	4.033529	2.971487	3.206912	2.002029
SK	1.926895	3.058641	2.590428	3.585166	3.104369	3.993606	3.045082	2.522236	2.579636
FI	2.209625	3.253319	2.790882	3.928432	3.406120	3.991190	3.059305	3.196134	2.716265
SE	2.401608	3.294234	2.812349	3.566282	3.573545	4.189050	3.095238	3.292633	3.103215

Source: authors own calculations based on Flash Eurobarometer 486 data.

– finally, the results and discussions led to the identification of answers to research questions and specific and optimal measures to be implemented to identify solutions to integrate the elements of digital technologies and sustainability at the perspective of each criterion considered level of SMEs.

3.3. Substantiation of Research Hypotheses

In the literature, there are presented different studies which emphasize the importance of sustainable development and innovation, the correlations between the business practices and the financial performance of companies, the main drivers and influence factors, considering the specific elements and features of the companies, in general, and SMEs, in particular. For example, starting from the definition of sustainable entrepreneurship, Tur-Porcar et al. [129] consider that the most important stimulating factors are those related to behavior, followed by business factors, especially related to profit, entrepreneur, and human relations. In the same climate of opinion, Xue et al. [130] show that the specific elements of the organizational context (internal and external) and the actions of stakeholders affect the sustainability of an organization. Moreover, more substantial support from the government, supply chain agents, and consumers could contribute to the successful implementation of sustainable business models [101]. Prior studies tried to identify the primary factors and drivers of small businesses' orientation towards sustainability (the financial gains, government regulations, availability of resources organization culture, entrepreneurial/management commitment, among others), as well as the potential barriers to the implementation of sustainable practices at the level of SMEs, such as lack of resources, lack of management commitment, lack of government support, and lack of consumer demand for a sustainable product [131]. The relationship between the adoption of sustainable business practices and the financial performance of companies, including SMEs,

has been addressed by several studies [132]. A total of 91% of studies indicate a stable link between the implementation of sustainable practices and financial performance; 5% point out a positive long-term impact on the company's financial performance; while 4% refer to a negative impact of the introduction of sustainable practices on financial performance. A possible explanation may be high expenditure/massive investment correlated with implementing measures and technologies to ensure a sustainable activity. Considering the size of the firms, Uhlaner et al. [133] conclude that larger companies, those in the tangible product sectors, family companies, and those with an innovative orientation are more likely to demonstrate sustainable entrepreneurial behavior. It should be added that the authors use change in turnover, change in result, and change in employment as control variables. Soomro et al. [134] test a model of sustainable entrepreneurship determined by four factors: ecofriendly people, green marketing factors, changing consumer behavior, and favorable market conditions. The study results show a positive and significant impact of these factors on sustainable entrepreneurship. Kim [135] starts from the analysis of variables that influence sustainable growth (management, technology, technical competence in marketing and innovation), and based on the correlations among them, it forms a strategy for innovating business models in various industries that can influence the sustainable performance of SMEs.

The hypotheses to be demonstrated in the current study, identified through research questions, run as follows:

H1. At the SME level, turnover (historical and forecast—Q4, Q5.2, Q6.2) and access to financing sources (Q10) generate SMEs' strategic orientation towards business sustainability (Q25).

H2. The accessibility of financing sources in the business environment in which SMEs operate (Q16.2) generates the strategic orientation towards the sustainability of enterprises (Q25).

H3. Environmental support for SMEs to become more sustainable (Q16.6) generates strategic orientation towards business sustainability (Q25).

H4. Turnover (historical and forecast—Q4, Q5.2, Q6.2) and access to financing sources (Q10) generate an increase in the implementation of digital technologies (Q22).

H5. Accessibility of funding sources in the business environment in which it operates (Q16.2) generates an increase in the implementation of digital technologies (Q22).

H6. Available business infrastructure (Q16.8) generates an increase in the implementation of digital technologies (Q22).

3.4. Research Model

Based on the structure of the hypotheses and the influences between the variables on which they were built, the research model for business was developed (Figure 1), which aims to demonstrate that, at the level of SMEs, the following will occur: (i) turnover and access to funding sources will lead to a focus on sustainability and digitization technology; (ii) the business environment will influence the existence of a strategy or an action plan for the transformation into a sustainable company; (iii) the evaluation of the business environment from the perspective of the company's technology infrastructure will trigger the approach of digital technologies by the company; (iv) the existence of a strategy or an action plan for the transformation into a sustainable company as well as the approach of digital technologies by the company will influence the elements and criteria represented by turnover, increase in turnover, the expected growth of the company and the company's ability to obtain external financing.

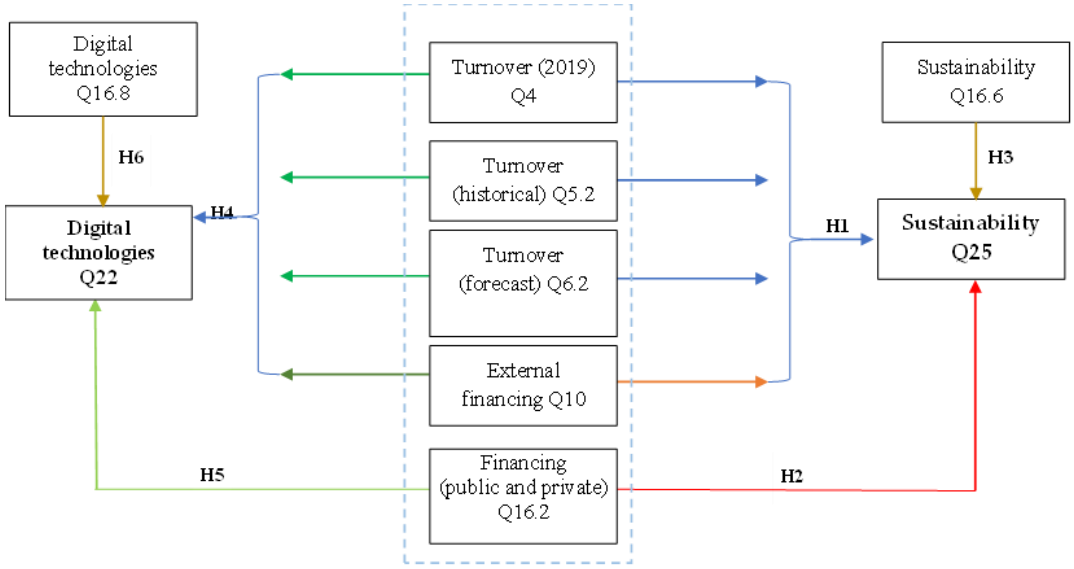

Figure 1. Research model and variables correlations.

3.5. Materials and Methods

The variables *Q*4, *Q*5.2, *Q*6.2, *Q*10, *Q*16.2, and *Q*16.6 are independent ones, being the elements of the input vector, further denoted by X. Depending on the hypothesis considered, the output variable *Y* can be *Q*25 for H1, H2, and H3 (sustainability) and Q22 for H4, H5 and H6 (digital technologies) (Table 3).

Table 3. Discussion per criterion from the perspective of its importance in the current research.

Variable	Item	Significance of the Item	Importance of the Item in the Study
Turnover	Q4	turnover (2019)	Independent variable, current
	Q5.2.	increase in turnover (after 2016)	Independent variable, historical
	Q6.2.	the projected growth of the company (according to the turnover)	Independent variable, forecast
Financing	Q10	the company's ability to obtain external financing	Independent variable, forecast
	Q16.2.	assessment of the business environment from the perspective of access to funding sources (public and private)	Independent variable, current
Sustainability	Q16.6.	assessment of the business environment from the perspective of the capacity to support transformation into a sustainable company	Independent variable, current
	Q25	existence of a strategy or an action plan for transformation into a sustainable company	Dependent variable
Digital technologies	Q16.8.	assessment of the business environment from the perspective of the company's technology infrastructure	Independent variable, current
	Q22	the approach of digital technologies by the company	Dependent variable

Source: developed by authors.

Regression analysis is the most effective approach to systematically describing the influence between variables from a dataset array. We intend to find regression models to describe the influence according to the hypotheses above. They have allowed us to perform systematic studies on the influence between certain variables of the datasets under investigation. They have also enabled us to predict the values of dependent variables with a certain confidence level (or assessment error), corresponding to any possible values of independent variables called predictors.

The regression models are built starting from the actual values of variables available in the dataset array (Table 2). Only an ideal regression model allows for the precise reproduction of the correspondence $Y = f_{ideal}(X)$, where X denotes the input variable

and Y represents the output variable, with both variables containing the current dataset array's actual values. Y is an N-size vector, while X can be an N-size vector or an N by M matrix, depending on the analyzed hypotheses. N = 27 for our dataset (the number of lines/EU countries in Table 2). For example, regarding the analyzed data, for Hypothesis H1, we have M = 4 (see Table 2):

$$X_{Q4,Q5.2,Q6.2,Q10} = \begin{bmatrix} Q4 & Q5.2 & Q6.2 & Q10 \end{bmatrix} = \begin{bmatrix} 2.646802 & 3.045814 & 2.529232 & 3.801837 \\ 1.361222 & 2.677335 & 2.613636 & 2.888004 \\ \vdots & \vdots & \vdots & \vdots \\ 2.401608 & 3.294234 & 2.812349 & 3.566282 \end{bmatrix};$$

$$Y_{Q25} = \begin{bmatrix} 2.580683 \\ 2.726744 \\ \vdots \\ 3.103215 \end{bmatrix}; \; f_{ideal} : \boldsymbol{R}^4 \to \boldsymbol{R}$$

A real-world regression model f provides approximated values of the output variable, denoted here Y_{mdl}:

$$Y_{mdl} = f(X) \tag{1}$$

The closer Y_{mdl} and Y are to each other, the better the regression model is.

Any regression model analytical expression (the related function f) can be linear or nonlinear [136]. Therefore, a mathematical criterion is required to choose the most appropriate regression model according to the best-fitting principle to the available data. This corresponds to minimizing the regression model's mean square deviation concerning the actual values [137]. A global measure of this criterion is given by the squared residual coefficient, introduced in the scientific literature as the coefficient of determination [138]:

$$\boldsymbol{R}^2 = 1 - \frac{\sum_{k=1}^{N} |y_k - y_{mdl,k}|^2}{\sum_{k=1}^{N} |y_k - y_{mean}|^2} = 1 - \frac{\sum_{k=1}^{N} \varepsilon_k^2}{\sum_{k=1}^{N} |y_k - y_{mean}|^2} \tag{2}$$

where y_k is the actual value of the k-th component of the dependent variable Y, corresponding to the kth object of the data set; $y_{mdl,k}$ is the approximated value given by the regression model except the deviation ε_k; $y_{mean} = \frac{1}{N} \sum_{k=1}^{N} y_k$ is the mean value of the variable Y. Values closer to 1 of the squared residual coefficient correspond to a higher quality of the regression model.

We tested various regression models treated as analytical functions to find the optimal (best matching) relationships according to Hypotheses H1, H2, H3 proposed above $Y_{mdl} = f(X)$. We tested linear, quadratic, and cubic functions to choose the most accurate models for each hypothesis, guided by the above criterion. The tests concluded that linear regression models are the most precise for all hypotheses; the squared residual coefficients are given by Equation (2) and range between 0.3 and 0.7.

After verifying the hypotheses, a multicriteria analysis has been performed on clusters (turnover, financing, sustainability, and digital technologies) in order to identify the classification of countries according to the established criteria and to propose sets of measures necessary for the integration of sustainability concepts and tools and digital technologies within the activities and processes developed by SMEs. A cluster analysis of data sets aims to create groups (clusters) so that objects in the same cluster are very similar and objects in different clusters are distinct. The same set of parameters defines each object of the cluster analysis, and the similarities between objects depend on the deviations between the values of their corresponding parameters. The similarity measure can be evaluated using several methods according to the specific application. The strategies to organize the data sets in clusters are mainly based on partitioning and hierarchical algorithms. However,

different algorithms may return different results on the same data, with larger or smaller intersection areas, depending on the specific application. Therefore, one must choose the most appropriate clustering algorithm for the given data set [139,140]. The critical point of the clustering algorithms lies in comparing every pair of objects in a data set, i.e., to evaluate the distance between every pair of objects. For a p-space set of N objects, where p denotes the number of variables that define an object, there are $N(N-1)/2$ distances, and each distance is a p-dimensional one. Various methods express distances in data analysis [139,141], but the most natural and widely used is the well-known Euclidean distance. The Euclidean distance between two objects is treated as p-space vectors whose elements are variables in the data set:

$$Z_1 = [z_{1,1}, z_{1,2}, \ldots, z_{1,p}],\ Z_2 = [z_{2,1}, z_{2,2}, \ldots, z_{2,p}]$$

is

$$d(Z_1, Z_2) = \sqrt{\sum_{i=1}^{p} (z_{1,i} - z_{2,i})^2} \tag{3}$$

where referring to our dataset array Z_1, Z_2 represent any 2 of the 27 Member States, for instance, BE and BG; $[z_{1,1}, z_{1,2}, \ldots, z_{1,p}]$ are the parameters associated with the object Z_1 and the criteria taken into account for clustering. For example, if $Z_1 \equiv BE$ and five criteria are envisaged, namely $Q4$, $Q5.2$, $Q6.2$, $Q10$, $Q16.2$, then $p = 5$ and the values of the parameters, rounded to two decimals, are (see Table 2):

$$z_{1,1} = 2.65;\ z_{1,2} = 3.04;\ z_{1,3} = 2.53;\ z_{1,4} = 3.80;\ z_{1,5} = 3.43$$

Concerning the spreading of values corresponding to a specific parameter in the dataset, the standard deviation is a valid related quantity defined as the mean distance from the mean value of the parameter. The standard deviation of a parameter P_i (for any $i = 1, 2, \ldots, p$) whose values are $z_{1,i}, z_{2,i}, \ldots, z_{N,i}$ is defined as

$$S_i = \sqrt{\frac{1}{N-1} \sum_{j=1}^{N} (z_{j,i} - \mu_i)^2} \tag{4}$$

where the mean value of the parameter is

$$\mu_i = \frac{1}{N} \sum_{j=1}^{N} z_{j,i} \tag{5}$$

For the dataset in Table 2 of size $N = 27$, the Equation (5) gives the mean value of the parameters related to the $Q4$ criterion:

$$\mu_{Q4} = \frac{2.64 + 1.36 + \ldots + 2.40}{27} = 2.17$$

while the Equation (4) gives the standard deviation

$$S_{Q4} = \sqrt{\frac{(2.64 - 2.17)^2 + (1.36 - 2.17)^2 + \ldots + (2.40 - 2.17)^2}{27 - 1}} = 0.404$$

The hierarchical clustering organizes objects as leaves of a cluster tree (or dendrogram) whose branches connect the leaves depending on the distances between them, given by type (3) equations. The tree is not a set of clusters, but rather it denotes a multilevel hierarchy of the studied objects, where nearest groups of objects at one (lower) level are combined into groups of objects at the next (higher) level. It allows exploring multiple clusterings of the analyzed data. One should only assess the threshold level of clustering that is most appropriate for the given application. This is why hierarchical algorithms are a prominent

class of clustering algorithms [140]. Linkage-based algorithms for hierarchical clustering start with singleton groups of pairs of nearest objects and repeatedly merge pairs of groups until the dendrogram is built. The linkage of a pair of groups is based on the distance between groups of objects. Therefore, the concept of distance should be adapted. There are various methods to evaluate such a distance as single distance, i.e., the shortest distance between two objects from the groups; complete distance, i.e., the largest distance between two objects from the groups; average distance, i.e., the mean distance between every pair of objects from both groups; centroid distance, i.e., the Euclidean distance between the centroids of two groups. In order to choose the most appropriate linkage method for a given data set, the cophenetic correlation coefficient can be used as a criterion [142]. This means investigating various linkage methods and retaining the one for which the value of the cophenetic correlation coefficient is the closest to 1.

4. Results and Discussion

Based on the data used and on the substantiation of the research hypotheses, we performed a detailed analysis leading to the validation/invalidation of each hypothesis, which will generate space for discussions based on the results obtained.

Hypothesis H1. Influence of *Q*4, *Q*5.2, *Q*6.2, *Q*10 on *Q*25.

Practically, the correlations to be demonstrated (validation or invalidation) based on hypothesis H1 will try to determine the impact that turnover (*Q*4), an increase in turnover (*Q*5.2), the projected growth of the company (*Q*6.2) together with the company's ability to obtain external financing (*Q*10) could have upon the strategy or the action plan for the transformation of the company into a sustainable one (*Q*25). The hypothesis is based on the assumption that the level of turnover and the capacity to attract external financing could contribute and ensure a viable strategy in the long term toward sustainable development.

The coefficients of the linear regression model built according to the method detailed in the paragraph 3.5 are 2.1864; 0.1674; −0.1603; 0.4687; −0.1764 and verify a relationship of type (1) as follows:

$$Y_{H1,\ mdl} = 2.1864 + 0.1674 \cdot Q4 - 0.1603 \cdot Q5.2 + 0.4687 \cdot Q6.2 - 0.1764 \cdot Q10$$

The graphical representation of the regression function is shown in Figure 2, where, to emphasize the influences, the constant term 2.1864 was ignored. The graphical representation shows that the variables *Q*5.2 and *Q*10 have negative influences, i.e., their increasing values lead to the decrease in *Q*25. On the other hand, variables *Q*4 and *Q*6.2 have positive influences on *Q*25.

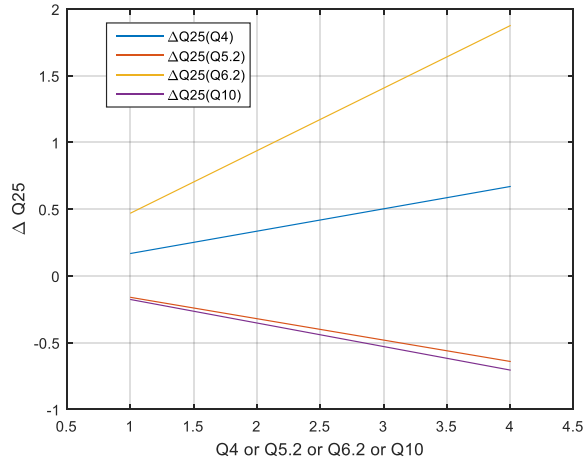

Figure 2. Regression function for *Q*4, *Q*5.2, *Q*6.2, and *Q*10 on *Q*25.

From the point of view of the economic model, built on our scenario, it can be seen that sustainability and any related elements are directly influenced by the variables specific to the current and projected financial situation of SMEs, which results in a much greater possibility for them to integrate the components of sustainability to the structure of their policies in the future. The historical evolution of the turnover and the capacity of SMEs to access external financing are not factors that drive the orientation of companies towards sustainability, namely the design and implementation of a strategy/plans for companies to become sustainable.

The regression function is beneficial for predicting the output variable for any possible combination of input variables with desired confidence bounds simply by computing the predicted output by means of the expression above of $Y_{H1,\ mdl}$. The quality of the prediction allowed by the regression function identified for Hypothesis H1 is verified based on known data for three randomly selected countries from different geographical areas (Western Europe—France, Baltic countries—Latvia, and Central and Eastern Europe—Bulgaria). The deviations of the predicted output variable Q25 from the actual values (see actual values in Table 2) are summarized in Table 4. These deviations are relatively small (below 3.5%), which confirms the good quality of the regression function and, implicitly, the accuracy of the prediction.

Table 4. The accuracy of prediction provided by regression function identified for Hypothesis H1.

	Actual Values (Taken from Table 2)					***Q*25 (Computed with the Regression Function)**	**Prediction Deviation [%]**
	***Q*4**	***Q*5.2**	***Q*6.2**	***Q*10**	***Q*25**		
FR	2.600004	3.010085	2.632018	3.340489	2.706208	2.7836	1.55
LV	1.548288	2.765676	2.212363	3.161396	2.649897	2.4816	−3.37
BG	1.361222	2.677335	2.613636	2.888004	2.726744	2.7008	−0.52

Source: developed by authors.

The predictability of the evolutions also supports the analysis of the correlations within the economic model. Thus, even in the case of positive influences (variables *Q*4 and *Q*6.2.), the more significant impact of the variable specific to the projected evolution can be observed and compared to the one based on the current situation. Further clarification can be made about the impact of the variable *Q*4—the level of turnover in 2019. At the European level, turnover is one of the indicators (along with the number of employees and total assets) in relation to which SMEs are classified by size. Thus, the definition and implementation of a sustainability strategy plan are more common at the level of medium-sized enterprises (with approaches and structures comparable in many cases to those of large companies—[35]). The negative influence perspective is identified in the case of the evolution of historical data on turnover and, in particular, in the case of the company's ability to obtain external financing, which is one of the main obstacles identified by SMEs in their development and in ensuring the sustainability of the company. This shows that financial resources (own or attracted) are not essential in a company's orientation towards sustainability [143,144].

Under the circumstances, Hypothesis H1 is partially validated.

Hypothesis H2. Influence of *Q*16.2 on *Q*25.

An economic explanatory approach of the hypothesis builds up on the effect that the assessment of the business environment from the perspective of access to funding sources (*Q*16.2) could have upon the strategy or the action plan for the transformation of the company into a sustainable one (*Q*25). The importance of accessing the private and public funding sources could be thus related to a strategy and an action plan for transformation into a sustainable company.

The coefficients of the linear regression function are 2.1069; 0.1762 and verify a relationship of type (1):

$$Y_{H2,\ mdl} = 2.1069 + 0.1762 \cdot Q16.2$$

The graphical representation of the regression function is shown in Figure 3, where, to highlight the influences more clearly, the constant term 2.1069 was ignored. The graphical representation shows that the variable *Q*16.2 has a positive influence, i.e., its increasing values lead to an increase in *Q*25. From the point of view of the economic model, it can be seen that the existence of a sustainability-driven strategy within the company is directly influenced by access to financing from private and public sources, as a critical parameter to characterize the country's business environment.

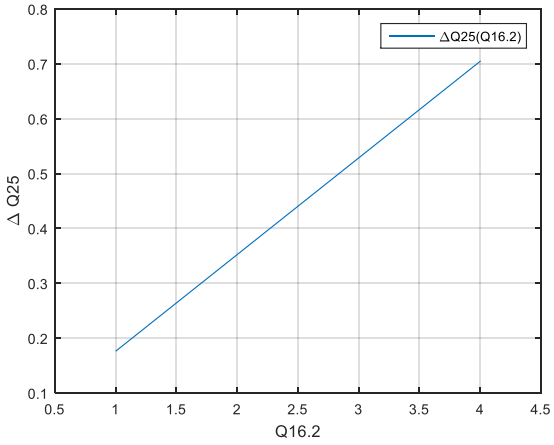

Figure 3. Regression function for *Q*16.2 on *Q*25.

The prediction quality allowed by the regression function identified for Hypothesis H2 is verified based on data known for the same three countries chosen for Hypothesis H1 (France, Latvia, Bulgaria). Deviations of the predicted output variable *Q*25 from the actual values (actual values in Table 2) are summarized in Table 5. These deviations are relatively small (less than 2%), which confirms the good quality of the regression function and, implicitly, the accuracy of the prediction that it allows.

Table 5. Accuracy of prediction provided by regression function identified for Hypothesis H2.

	Actual Values (Taken from Table 2)		***Q*25 (Computed with the Regression Function)**	**Prediction Deviation [%]**
	Q16.2	**Q25**		
FR	3.155640	2.706208	2.6629	−0.87
LV	2.799003	2.649897	2.6000	−1.00
BG	3.012178	2.726744	2.6376	−1.78

Source: developed by authors

Similar to the case of Hypothesis H1, the analysis of the correlation between the independent and dependent variables shows the positive but moderate impact of the perspective of accessibility of financing on the existence of a strategy of SME sustainability. Therefore, Hypothesis H2 is validated based on the correlation within the research model for business.

Hypothesis H3. Influence of *Q*16.6 on *Q*25.

Economically, the hypothesis follows the capacity of the business environment to support the transformation of a company into a sustainable one. This hypothesis is based on the impact that the assessment of the business environment from the perspective of the capacity to support transformation into a sustainable company (*Q*16.6) could have upon the strategy or the action plan for the company's transformation into a sustainable one (*Q*25).

The coefficients of the linear regression function are 2.0223 and 0.2176 and verify a relation of type (1):

$$Y_{H3,\ mdl} = 2.0223 + 0.2176 \cdot Q16.6$$

The graphical representation of the regression function is shown in Figure 4, where, to emphasize the influences more clearly, the constant term 2.0223 was deliberately ignored. The graphical representation shows that the variable *Q*16.6 has a positive influence, i.e., its increasing values lead to an increase in *Q*25.

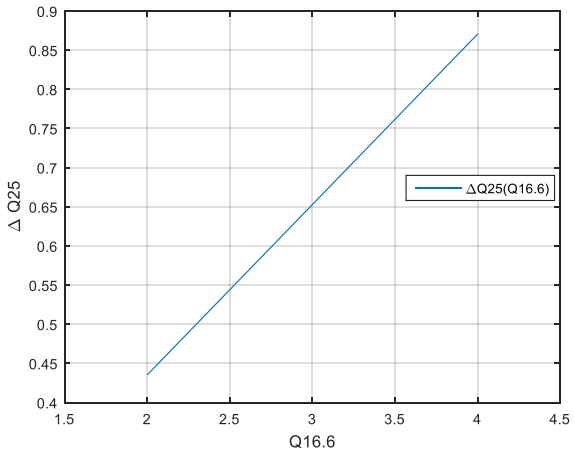

Figure 4. Regression function for *Q*16.6 on *Q*25.

From the point of view of the economic model and the analysis of the correlation between independent and dependent variables, we can claim the positive and direct influence of the availability of support for enterprises to become more sustainable and substantiate a strategy or a firm-level sustainability plan in the business environment. Several studies have shown that legislation, incentives in the form of loans, tax facilities, and other economic benefits can enhance the orientation of SMEs towards sustainability [145–147].

Therefore, Hypothesis H3 is validated based on the correlation within the research model for business.

The quality of the prediction allowed by the regression function identified for Hypothesis H3 is verified based on data known for the same three countries chosen for Hypotheses H1 and H2 (France, Latvia, Bulgaria). The deviations of the predicted output variable *Q*25 from the actual values (see actual values in Table 2) are summarized in Table 6. These deviations are relatively small (below 2.5%), which confirms the good quality of the regression function and, implicitly, the accuracy of the prediction that it allows.

Table 6. Accuracy of prediction provided by regression function identified for Hypothesis H3.

	Actual Values (Taken from Table 2)		***Q*25 (Computed with the Regression Function)**	**Prediction Deviation [%]**
	***Q*16.6**	***Q*25**		
FR	2.848194	2.706208	2.6421	−1.28
LV	2.627918	2.649897	2.5942	−1.11
BG	2.666851	2.726744	2.6027	−2.48

Source: developed by authors

Hypothesis H4. Influence of *Q*4, *Q*5.2, *Q*6.2, and *Q*10 on *Q*22.

The correlations to be demonstrated based on hypothesis 4 will try to determine the impact that turnover (*Q*4), an increase in turnover (*Q*5.2), the projected growth of the company (*Q*6.2) together with the company's ability to access external financing (*Q*10) could have upon the approach of digital technologies of the companies (*Q*22). The hypothesis is based on the assumption that the level of turnover and the capacity to access external financing could positively influence the implementation of digital technologies into a company.

The coefficients of the linear regression function are 5.5105; 0.1449; −0.3560; −0.3723; −0.2131 and verify a relationship of type (1):

$$Y_{H4,\ mdl} = 5.5105 + 0.1449 \cdot Q4 - 0.3560 \cdot Q5.2 - 0.3723 \cdot Q6.2 - 0.2131 \cdot Q10$$

The graphical representation of the regression function is shown in Figure 5, where, to highlight the influences more clearly, the constant term 5.5105 was ignored. The graph shows that the variable *Q*4 is the only one that has a positive influence, with all the others having a negative influence on *Q*22. The quality of the prediction allowed by the regression function identified for Hypothesis H4 is verified based on data known for the same three countries chosen for the previous hypotheses (France, Latvia, Bulgaria). The deviations of the predicted output variable *Q*22 from the actual values (see actual values in Table 2) are summarized in Table 7. These deviations are relatively small (below 2.5%), which confirms the good quality of the regression function and, implicitly, the accuracy of the prediction that it allows.

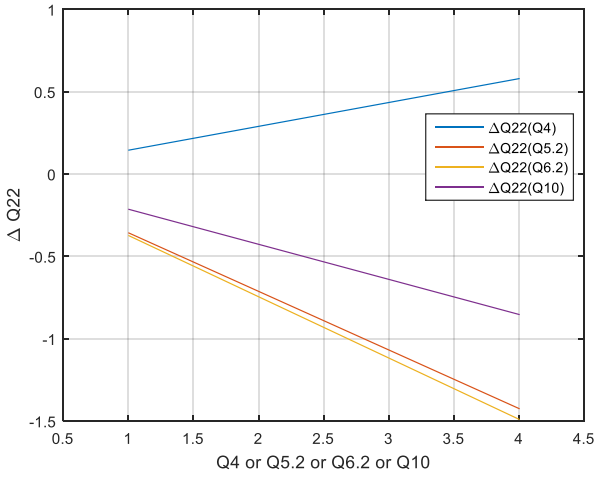

Figure 5. Regression function for *Q*4, *Q*5.2, *Q*6.2, and *Q*10 on *Q*22.

Table 7. Accuracy of prediction provided by regression function identified for Hypothesis H4.

	Actual Values (Taken from Table 2)					*Q*22 (Computed with the Regression Function)	Prediction Deviation [%]
	*Q*4	*Q*5.2	*Q*6.2	*Q*10	*Q*22		
FR	2.600004	3.010085	2.632018	3.340489	3.016461	3.1240	2.1515
LV	1.548288	2.765676	2.212363	3.161396	3.192698	3.2530	1.2065
BG	1.361222	2.677335	2.613636	2.888004	3.141962	3.1662	0.4853

Source: developed by authors

Drawing from the analysis, it is evident that, in a period of high uncertainty, the approach of digital technologies by companies is positively influenced by the current situation of companies (independent variable—turnover) while historical data (the independent variable—the previous evolution of the turnover) as well as the forecast ones (the independent variables—the projected growth of the company in terms of turnover, and the company's ability to obtain external financing) have a negative influence, also generated by the context with an unpredictable dynamic. The regression diagrams shown in Figure 5 show that the independent variables specific to future projections have a more pronounced negative impact on the approach of digital technologies by the company, compared to the historical independent variable, whose negative impact is low. As for the current independent variable, represented by turnover (shown under H1), its positive influence reflects that their size determines the complexity of digital technologies implemented at the company level. Under the circumstances, Hypothesis H4 is partially validated.

Hypothesis H5. Influence of *Q*16.2 on *Q*22.

An economic approach of the current hypothesis is funded on the effect that the business environment assessment from the perspective of access to funding sources (*Q*16.2) could have upon the digital technologies of the companies (*Q*22). Moreover, the hypothesis underlines the imperative necessity of connecting the business environment to the newest digital technologies, especially in the context of the pandemic crisis.

The coefficients of the linear regression function are 3.698 and −0.2009 and verify a relationship of type (1):

$$Y_{H5,\ mdl} = 3.6498 - 0.2009 \cdot Q16.2$$

The graphical representation of the regression function is shown in Figure 6, where, to highlight the influences more clearly, the constant term 3.6498 was ignored. In any economic situation, the implementation of technology requires financial resources. Nevertheless, in the current conditions of uncertainty, the assessment of the business environment from the perspective of access to financing does not prove to be favorable to the adoption of digital technologies by the company. Moreover, as other studies [148] have shown, financial resources are neither a barrier nor an essential driver for SMEs' digitalization.

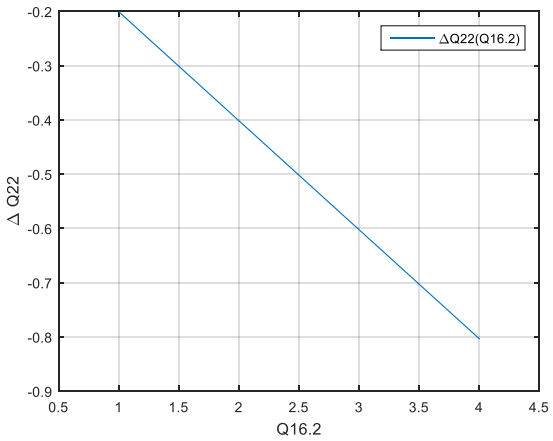

Figure 6. Regression function for *Q*16.2 on *Q*22.

This fact is also confirmed by the regression model with the coefficient of dependence of about 0.2 units, which denotes a slight sensitivity of the variable *Q*22 related to *Q*16.2. Thus, the regression diagram (Figure 6) confirms that the negative influence is relatively slight (the variation of *Q*16.2 on their whole domain from 1 to 4 units leads to a variation of *Q*22 of 0.6 units only). Under the circumstances, Hypothesis H5 is invalidated.

The quality of the prediction allowed by the regression function identified for Hypothesis H5 is verified based on data known for the same three countries chosen for the previous hypotheses (France, Latvia, Bulgaria). The deviations of the predicted output variable *Q*22 from the actual values (see actual values in Table 2) are summarized in Table 8. These deviations are relatively small (below 2.5%), thus confirming the quality of the regression function and, implicitly, the accuracy of the prediction that it allows.

Table 8. Accuracy of prediction provided by regression function identified for Hypothesis H5.

	Actual Values (Taken from Table 2)		***Q*22 (Computed with the Regression Function)**	**Prediction Deviation [%]**
	***Q*16.2**	***Q*22**		
FR	3.155640	3.016461	3.0158	−0.01
LV	2.799003	3.192698	3.0875	−2.10
BG	3.012178	3.141962	3.0446	−1.95

Source: developed by authors

Hypothesis H6. The influence of *Q*16.8 on *Q*22.

The correlations to be demonstrated will substantiate the effect that assessment of the business environment from the perspective of the company's technology infrastructure (*Q*16.8) could have upon the approach of digital technologies of the companies (*Q*22). The hypothesis is based on the assumption that the business environment influences the level of technological infrastructure and, for its part, could influence the implementation of digital technologies into a company. Again, the health crisis has brought to light the importance of implementing digital technologies into daily activities.

The coefficients of the linear regression function are 1.8240 and 0.3030 and verify a relation of type (1):

$$Y_{H6,\ mdl} = 1.824 + 0.303 \cdot Q16.8$$

The graphical representation of the regression function is shown in Figure 7, where, to highlight the influences more clearly, the constant term 1.824 was ignored. The graph shows that the variable *Q*16.8 has a positive influence on *Q*22.

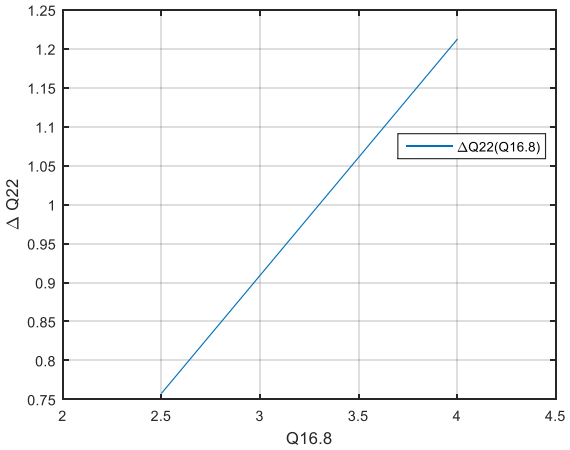

Figure 7. Regression function for *Q*16.8 on *Q*22.

According to the analysis, assessing the business environment from the perspective of the digital technology infrastructure (spaces conducive to digital techniques, internet connection, etc.) is stimulating for SMEs in terms of the level of approach to digital technologies. In the current context, the digital components, especially in the case of their existence and use, acquire new valences, imposing a new approach to the way of doing business by SMEs. Figure 7 highlights the relationship of influence between the two variables.

Thus, Hypothesis H6 is validated.

The quality of the prediction allowed by the regression function identified for Hypothesis H6 is verified based on data known for the same three countries chosen for the previous hypotheses (France, Latvia, Bulgaria). The deviations of the predicted output variable *Q*22 from the actual values (see actual values in Table 2) are summarized in Table 9. These deviations are relatively small (below 3.5%), which confirms the good quality of the regression function and, implicitly, the accuracy of the prediction that it allows.

Table 9. Accuracy of prediction provided by regression function identified for Hypothesis H6.

	Actual Values (from Table 2)		***Q*22 (Computed with the Regression Function)**	**Prediction Deviation [%]**
	***Q*16.8**	***Q*22**		
FR	3.973851	3.016461	2.8432	−3.47
LV	3.363470	3.192698	3.0282	−3.29
BG	4.112904	3.141962	3.0703	−1.43

Source: developed by authors.

Based on the previous analysis, summarized in Figure 8, the influences among the elements of the research can be identified and discussed.

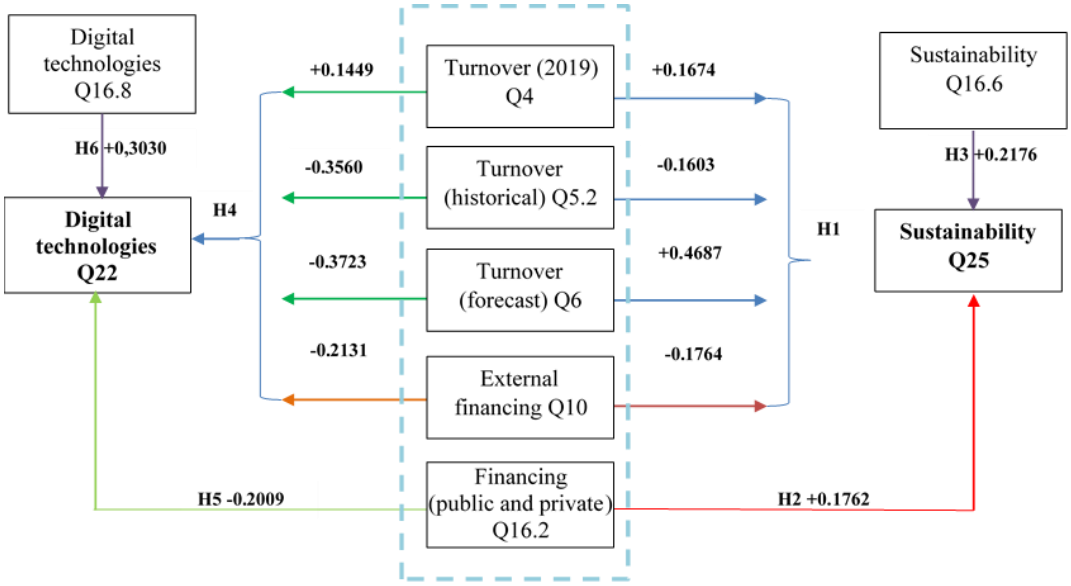

Figure 8. Summary of the influences among the elements of research.

At the level of economic performance, the two variables of interest in structuring the final economic model are represented by *Q*4 (turnover in the reference year, 2019) and *Q*6.2. (expected growth of the company) (seen as independent variables that impact, partially validating Hypotheses H1 and H4). Both positively influence *Q*25 (the existence of a strategy or an action plan that will help transform the company into a sustainable one), and *Q*4 also influences *Q*22 (the company's approach to digital technologies).

From a funding perspective, the positive influence is established between *Q*16.2. (evaluation of the business environment from the perspective of access to financing sources) and *Q*25 (existence of a strategy or an action plan that will transform the company into a sustainable one), as proven by H2.

At the level of sustainability policies, the variable *Q*16.6. (evaluation of the business environment from the perspective of the ability to support the transformation into a sustainable company) positively influences *Q*25 (the existence of a strategy or an action plan that will contribute to the company's transformation into a sustainable one), as proven by H3. Similarly, technology policies and strategies are based on the same positive relationship established between *Q*16.8. (evaluation of the business environment from the perspective of the company's technology infrastructure, independent variable, that fully validates H6) and *Q*22 (approach of digital technologies by the company).

It can be noted that the entire previous research generated the answer to the first two questions of the research: What is the causal relationship between the components that are the object of the research model for business, represented by funding-turnover and sustainability? (RQ1) and What is the causal relationship between the variables represented by funding-turnover and digital technologies? (RQ2).

The above analysis based on Hypotheses H1 to H6 used historical statistics data and demonstrated the viability of this approach. Under these conditions, the identified models can be trusted for medium- and long-term predictions about business sustainability. As an example for the H1 hypothesis, the case in which the randomly chosen values *Q*4 = 2.1, *Q*5.2 = 2.9, *Q*6.2 = 2.5, *Q*10 = 3.1 of the input (simultaneous predictor values), corresponding

to a present state of a certain company under study, lead to Q25 (mean predicted value) of the following:

$$\begin{aligned} Y_{H1,\ predicted} &= 2.1864 + 0.1674 \cdot Q4 - 0.1603 \cdot Q5.2 + 0.4687 \cdot Q6.2 - 0.1764 \cdot Q10 \\ &= 2.1864 + 0.1674 \cdot 2.1 - 0.1603 \cdot 2.9 + 0.4687 \cdot 2.5 - 0.1764 \cdot 3.1 = 2.698 \end{aligned}$$

It is ranging between 2.4636 and 2.9326, with a confidence bound of 90%. This predicted value is located on the upper half side of its possible range from 1 to 5 according to a Likert approach. This shows obvious premises for the business policy of the respective companies to be sustainable in the medium and long term.

Multicriteria Clustering

If the parameters of the analyzed data are organized in the categories finance and turnover, digital technology, and sustainability (Figure 8), a cluster analysis is performed for each of these categories. Each category depends on specific criteria as seen in Table 1: Financing and Turnover—*Q*4, *Q*5.2, *Q*6.2, *Q*10, and *Q*16.2; Digital Technology—*Q*16.8 and *Q*22; Sustainability—*Q*16.6 and *Q*25.

Linked-based hierarchical clustering based on standardized Euclidean distance and average linkage leads to the dendrograms shown in Figure 9. We chose this kind of clustering due to the higher values of the cophenetic correlation coefficient compared to those corresponding to other linkage algorithms tested on our data sets: 0.81 for finance and turnover, 0.83 for digital technology, and 0.79 for sustainability. Three clusters are identified and shown in green, red, and blue in Figure 9.

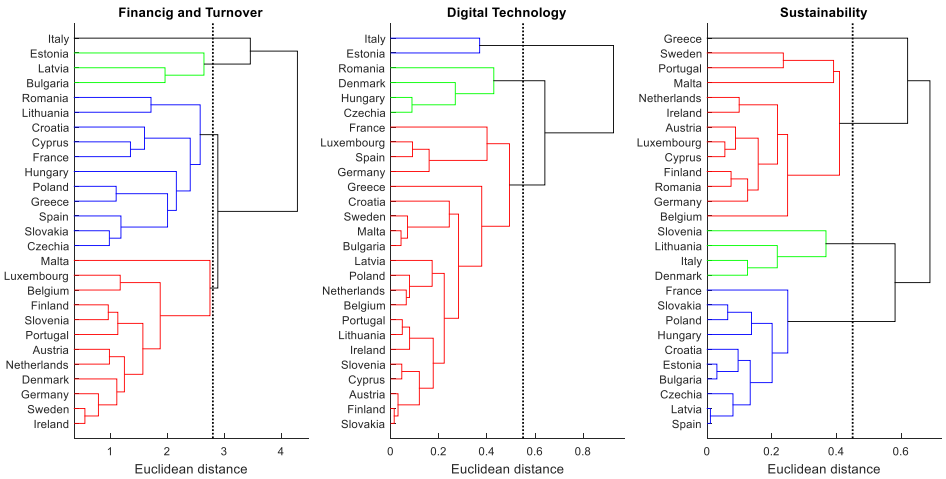

Figure 9. Multicriteria Clustering.

By computing the centroids of the highlighted clusters, one can assess the significance of each color (Table 10).

Table 10. Assessment of clusters' categories in Figure 9 based on their centroid values.

	Green (Low)	Blue (Medium)	Red (High)
Financing and Turnover	2.7034	2.9415	3.1077
Digital Technology	3.1679	3.3460	3.6110
Sustainability	2.6125	2.6421	3.0503

Source: developed by authors.

The cluster analysis of the Member States whose SMEs provided the data shows minimum differences between the categories of criteria (financing and turnover, sustainability, and digital technologies) that include the variables by periods. Starting from the correlations and interdependencies demonstrated through the economic model and the validated

hypotheses, the cluster analysis reveals a concordance between the cluster of countries with a high level of financing parameters and those reporting higher technology and sustainable development levels. The minimum levels of the three analysis criteria are recorded by a small number of countries, the numerical values being close to the average levels.

Thus, from a financing perspective, it can be claimed that differences between countries can be eliminated or reduced through coherent financial policies oriented towards sustainability and digital technologies.

Specifically, from a technological perspective, SMEs, regardless of geographical location and classification, depending on their significance at the cluster level, should be aware that technology can support them in identifying responses to the new challenges represented by the pandemic economy. At least, in the medium term, the SMEs should adapt to the new conditions for carrying out the activities due to the restrictions, to more fierce competition and higher innovation necessary for the development in atypical conditions. As such, SMEs need to be able to withstand and adapt to all these new and often uncertain dynamics, starting from the support that digital technologies provide, allowing them to be much more flexible in their approach and configuring their structure with a view to innovation and development by optimizing revenues and reducing costs, improving productivity, developing the geographical area covered and accessing new customers and, last but not least, ensuring high access to information and processes to stimulate much broader innovation.

On the other hand, from the perspective of sustainability, although the concept has different meanings for each company, it represents the integration of adaptability and flexibility within the research model. Sustainable activities and processes offer new revenue opportunities but are driven by demand for sustainable products and services.

For the SMEs subject to the study, regardless of their geographical location and classification, depending on their significance, at the level of a cluster, the areas of interest from the perspective of sustainability-driven objectives are included in (i) the need, at the level of SMEs' potential, for coherence, a multisectoral and long-term approach in order to strengthen and substantiate the role played by SMEs in economic, financial, social and environmental sustainability. The strategies that SMEs develop and implement should adopt inclusive business models that can be adapted to climate change, specific to a circular economy, stimulating social innovation and environmental protection; (ii) accelerating all reforms, laws, and regulations underlying recovery, strengthening adaptability and environmental protection; (iii) promoting inclusive digitalization, by implementing digital technologies that contribute and substantially support the new vision and functioning of the economy and define the approach of markets, finance, and technologies on new foundations in continuous dynamics; (iv) promoting financial inclusion by adopting and implementing new innovative and digital financing models, technologies and digital financial services, which provide potential solutions to situations of financial exclusion for SMEs; (v) developing and expanding sustainable market access for SMEs through digitalization and public procurement, which is presented as a sustainable tool in achieving this goal of sustainability; (vi) investment in education and training, in the development of entrepreneurial skills, as building the entrepreneurial mindset and skills is essential to the capacity for adaptation, innovation and professional integration of SMEs.

All these suggested action directions and measures try to find answers and provide some solutions for the main issues identified by the research model based on the literature review, focused on correlations among financing and turnover, sustainability, and digital technologies as key factors in SMEs evolution and development considering the current conditions of international crises.

5. Conclusions and Recommendations

5.1. Findings and Contributions of the Study

The context of the pandemic crisis has led to significant structural changes in the way of substantiating and carrying out the activities of companies and SMEs in particular. The

vulnerability of SMEs in economic crises has been accentuated by the particular situation generated by the current crisis [1,3]. This fact determined the adaptation and reorientation of the activities towards the fields of digital technologies, given the necessity of ensuring the sustainability of the companies [17,18] and the restrictions relating to the accessibility of the financing sources, investment [7,33] and innovation [26].

It is noteworthy that, although conducted at the beginning of the COVID 19 crisis, the survey covered the period February–May 2020, when the harshest and most numerous restrictions were imposed on European countries and, implicitly, on SMEs. Based on previous developments, but facing an uncertain future, SMEs were in a position to reconsider their vision on financing, turnover, sustainability, and digital technologies. In this context, a detailed analysis was required, based on the responses and framing of SMEs, and a set of solutions could support the integration of the components of sustainability and digital technologies at the level of activities.

The research regarding SMEs is an original combination of theoretical elements related to SMEs business during a crisis and the creation of a research model which could offer solutions to changes in the conditions of uncertainty, such as the pandemic crisis. This study contributes to the extension of current knowledge on SMEs from the perspective of an integrated vision, which brings together, for the first time within the same structure, specific elements—funding and turnover, sustainability, and digital technologies—by providing a new research model for business, based on the correlation among these essential elements for the existence and development of SMEs. The value of the research consists of its uniqueness of linking theoretical references concerning critical elements of the business (funding, turnover, sustainability, and digital technologies) to a specific research model for the small and medium enterprises defined as the core of the European economy, under the conditions of the COVID-19 pandemic crisis.

The research questions that generated the hypothesis flow were founded on the current context where SMEs are obviously influenced by the new developments and trends of sustainability, digital technologies, and financing. The research model for business developed in the paper present in an innovative approach the interconnections between the key elements of the study and their influence on the European SMEs. Moreover, for the EU SMEs, the areas of interest from the perspective of sustainability and innovation objectives provided some action directions and measures that can offer answers and solutions for the main issues identified by the research model, focused on correlations among financing and turnover, sustainability and digital technologies as driving factors in SMEs' lifecycle, considering the current situation.

5.1.1. Theoretical Implications

The theoretical impact of the paper on the literature on research models dedicated to SMEs that connect funding, turnover, sustainability, and digital technologies, is complex and could be applied at an extended level. This research contributes to the development of current theoretical knowledge on SMEs from the perspective of an integrated vision, which brings together, for the first time within the same structure, specific elements—funding and turnover, sustainability, and digital technologies—by providing a new research model for business, within SMEs, the core of the European economy.

The research presented in the paper contributes to the closure of the gap in the literature because there is no standard model accepted and adopted by all SMEs providing a common language to evaluate traditional processes and bring innovation into their business. The findings in this context add to the arguments for a reinforcing and adaptable nature of digital technologies and sustainability based on the company's financing capacity in the new business environment of SMEs. Moreover, the research presented explains how structural and cognitive approaches mediate the relationship between dependent and independent variables within a new business innovative environment for SMEs' communities.

More detailed, the impact of the theoretical approach can be seen on multiple levels of interest, represented by (i) a clear and detailed understanding of the critical influence that

the four elements, included in the research model, could have upon the actual development of SMEs, (ii) the scientific knowledge concerning the role of integrating financial, technological and social aspects on SMEs settings, (iii) the role of the business environment, connected with technology and sustainability, on the development of models that facilitate research and empirical approaches within SMEs and (iv) the configuration of SMEs activities and processes as to be able to connect and implement the components of the research model into their business model, specific to their activities.

5.1.2. Managerial and Policy Implications

If, prior to the COVID-19 crisis, SMEs presented their plans and strategies with caution, albeit on a note of optimism, during and especially after the peak of the crisis in 2020 and beyond; in 2021, caution and optimism about economic growth and development and new investment opportunities are replaced by a continuing attempt at survival and, in the worst case, bankruptcy. Thus, SMEs have had to face a decrease in the number of customers and their demand and, automatically, a substantial decrease in revenues, numerous interruptions, most of them sporadic, in the production and supply chains, as well as factors which have left their mark on the skills and well-being of employees, all influencing the company's financing capacity, sustainability and the ability to include and adopt new digital technologies. Moreover, although sustainability is one of the critical terms invoked by the EU when discussing SMEs, to the vast majority of them, sustainability is placed in second place due to the orientation of SMEs on profit, income, and growth and as a result of identifying sustainability as a long-term investment without an apparent short-term return [149].

Under these circumstances, several approaches are necessary which, in general, can form the basis of a return to a normal situation characterized by development and stability: (i) optimal use of financial resources and banking and financial incentives provided by states and governments; (ii) identification of all opportunities and alternatives for diversifying and adapting the products and the services provided and implementing those that correspond to the specific activity; (iii) identification of all opportunities and alternatives for the use of new digital technologies and their implementation, depending on the specificity of the activity carried out, in order to overcome the barriers of economic communication; (iv) development of sustainable programmes dedicated to SMEs, which do not focus their approach and applicability only on profit and growth, seen as primary objectives, but also on compliance with the requirements of the sustainable development objectives; (v) identification of all means and methods of application and implementation of the new regulations, specific to the development of the company's activities.

In short, entrepreneurs must show flexibility and adaptability in managing disruptive developments specific to the current context, be proactive in reconfiguring the business model according to new challenges from the external environment, but also according to their capabilities and resources.

Although the uncertainty regarding the digital standards developed and applied in the future, the numerous problems generated by information and network security, and the lack of an adequate infrastructure generate reluctance regarding the digitalization technology, many SMEs have applied and developed this process.

From the perspective of adopting digital technologies, a set of solutions can be represented by (i) access to IT tools and services either free of charge or at low cost; (ii) existence and availability in the online environment of all the resources and archives of data and information necessary to carry out different activities in different fields; (iii) tailored training and counseling programs of IT technologies, their adoption and use in the current activities.

Although the research was initiated from the assumption that no common model can integrate sustainability, financing, and innovation by digitalization for SMEs, the proposed solution provided a common language through which companies can evaluate traditional processes and bring together the research components into their business activities. Thus, an integration of the component represented by digital technologies will be achieved at the

level of the main components of any economic activity, represented, on one side, by the suppliers and, on the other, by customers and other stakeholders.

On the other hand, although many SMEs have identified barriers to implementation and sustainability orientation, including the lack of knowledge needed to integrate sustainability within the business model, they have created and implemented or will create and implement a strategy or action plan to become sustainable [150].

From a sustainability perspective, a set of solutions can be represented by (i) training entrepreneurs in the spirit of the values specific to the Sustainable Development Goals (SDGs) and from the perspective of the influence that these goals have on the value of SMEs; (ii) consumer-oriented consumer demand for ethical SMEs; (iii) collaboration with those successful SMEs in order to develop a set of tools specific to sustainability; (iv) the application of a generic structure, implemented together with EU SME policies, to provide a set of tools on how to integrate sustainability, in a way that aligns with the requirements of the Sustainable Development Goals.

As in the case of digital technologies, the sustainability component finds its integration by correlating with suppliers and stakeholders, providing sustainable products and services, and through connections with customers and stakeholders to substantiate sustainable activities.

The sets of proposed solutions, materialized in answer to question RQ3 of the research, are based on the elements of sustainable financing represented by the turnover and the sources of financing.

5.2. Research Limitations

We are aware that, like all studies, this paper is not immune from limitations, and future research could expand the present work in several ways.

First, the use of data for the period February–May 2020 has, to some extent, restricted the area of analysis, which is why future research will address and use data provided for the last quarters of 2020, including 2021, data that, at the moment, are not published.

Second, the lack of integrating the sustainability, digital technologies, financing, and turnover in a research model for business in EU SMEs, together with the reluctance of SMEs to implement the components of sustainability and digital technologies (accentuated by the low degree of accessibility to financial resources) must be underlined.

Finally, the solutions are not exhaustive but lend themselves to improvement based on the policies, strategies, and measures adopted at the level of the European Union and of each Member State.

Despite the aforementioned limitations that could be amended through further research steps, the study's political and managerial implications are relevant and could be further strengthened through future research that could consist of integrating data concerning 2020, including 2021 (data not yet published).

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