The impact of the pandemic crisis on the digital transition process of Italian SMEs

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Abstract

In recent years, the digital revolution has impacted the entrepreneurial system globally, forcing companies to review their business models, products, and services value proposition. Companies must implement digital technologies in production processes to exploit new opportunities. This requires investing in machinery and devices and acquiring new knowledge.
The national and European economic system mainly comprises Small and Medium-Sized Enterprises (SMEs), characterized by low managerial skills and undercapitalization, which may hinder the required investments in information technology.
In Italy, the digital transition is constrained by the structural limits of its conservative entrepreneurial fabric. However, the recent pandemic crisis has accelerated this digital transition process. More and more companies have invested in R&D to increase the production process's automation level and improve their digital capabilities.
Literature has been widely investigating the impact of the pandemic crisis on the innovation process of SMEs adopting different perspectives.
The study aims to answer the following research questions (RQs).
RQ1: Which main foci can be identified in literature facing the impact of COVID-19 on the SMEs' innovation process?
RQ2: Which new needs arose during the pandemic fostering digitalization?
To answer RQ1, a Structured Literature Review (SLR) is adopted (128 studies identified on the SCOPUS database).
To answer RQ2, a qualitative methodology is used based on direct observation of two Italian firms

Keywords: Digital disruption, Small and Medium Enterprises, COVID-19, crisis, innovation

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1. Introduction

The irreversible digital transformation inherent to the entire socio-economic system, representing the current culmination of technical and scientific progress that has been taking place for over two centuries, is identified as 'Industry 4.0' (Lombardi *et al.*, 2021). There are two phenomena around which the technological scaffolding of Industry 4.0 is built: digitization and the Internet of Things (IoT) (Marchini *et al.*, 2019; Dicuonzo *et al.*, 2021; Cappelli and Cavallini, 2021; Alhalalmeh, 2022). Digitization consists of converting reality into data through machines, which no longer need human input since the algorithms on which they are based allow them to derive the information to react to specific stimuli. IoT is the machines' ability to connect to the outside world and each other, communicating, thus transmitting the data generated. Compared to previous ones, the fourth industrial revolution is characterized by the quest for both production and society to be maximally connected (Nielsen and Montemari, 2021). Although Industry 4.0 technologies can improve enterprise performance, several studies point out that the process of transformation and adaptation is arduous for SMEs, underlining the challenges they may face in adopting digital technologies (Caldarelli *et al.*, 2016; Cupertino *et al.*, 2018). The national and European economic system is mainly composed of SMEs, and this concentration affects the speed, efficiency and effectiveness of the digital transaction process. Indeed, they are characterized by structural limitations that make them more vulnerable, like low financial resource availability and lack of specialized knowledge (Dong and Men, 2014; Cesaroni and Sentuti, 2015; Culasso *et al.*, 2022). Insufficient working capital, poor managerial training, and rough strategic use of forecasting planning and control methods affect SMEs' innovativeness (Ferraris *et al.*, 2017). Innovation is the only way for SMEs not to succumb to the pressure that processes, such as globalization and digitalization, have provoked. Digitalization is essential to survive in a market of increasing unpredictability, fuelled by the shortening of product lifecycles and the demand for extreme product customization (Hofmann and Rüsch, 2017; Kamal *et al.*, 2020). On the other hand, the disadvantaged position to which the new context relegates SMEs endorses this gap between large and small companies and between European and Italian SMEs (Klein and Todesco, 2021). In Italy, the digital transition is held back by the structural limits of its entrepreneurial fabric and by a radical attachment to tradition (Cortesi, 2004). The recent pandemic crisis has accelerated this digitalization, and in Italy, more and more companies have invested in R&D to improve their digital capabilities and increase the automatization of the

production process (Lombardi, 2021; Fissi and Grazzini, 2021). As a result, the basic level of digitalization of Italian SMEs up to 2019 was below the European average (European Commission, 2020), whereas in 2021, the situation was reversed (European Commission, 2021). These results suggest a direct impact of the pandemic crisis on implementing new digital technologies in Italian SMEs.

Literature has been widely investigating the impact of the pandemic crisis on the innovation process of SMEs adopting different perspectives.

In light of this, the study aims to answer the following research questions (RQ).

RQ1: What main foci can be identified in literature facing the impact of COVID on the SMEs' innovation process?

RQ2: What new needs arose during the pandemic fostering digitalization?

The authors carried out a Structured Literature Review (SLR) (Paoloni and Demartini, 2016), a literature classification widely used in business studies to classify them according to four lenses: Article Focus, Research Area, Geographic area, and Research method. The present work considers 128 studies among articles, conference papers, book chapters and books identified on the SCOPUS database by searching "innovation", "SMEs*", and "COVID". In light of the findings, the authors focused on directly observing two Italian firms, representing future broader and deeper research pilot cases.

The analysis confirms the pandemic crisis's positive impact on corporate digitization, noticing a more intense use of the technologies already present and the acquisition of other digital tools in response to new needs. It emerges that the primary needs arising from the deployment of COVID-19' are flexibility, security and connectivity. Notwithstanding these emerging needs, our analysis showed that digital progress in companies is closely related to the business model adopted. The results also reveal that companies active in the same sector may sometimes show opposing development needs depending on the characteristics of their business models. Therefore, the new technologies to be implemented and the digitization processes to be undertaken are also different in responding to opposing needs.

The work is structured as follows. Section 2 contains a context analysis; section 3 defines the research methodology used by the authors; section 4 answers RQ1; section 5 exposes the findings derived from the pilot case studies. Section 6 contains the discussion and concluding remarks, outlining the implications of the work and declaring its limits.

2. Context analysis

The national and European economic system predominantly comprises SMEs. This concentration can incisively mark the speed, efficiency, and effectiveness of the digital transaction process. While the flexible structure of SMEs and the high concurrence of the environment in which they orbit can encourage the small entrepreneur to pursue the search for new knowledge, on the other hand, the low managerial capacity, exacerbated by a chronic undercapitalization of the structure, hinders small entrepreneurs from investing in integrated information systems to support management, or in the absorption of highly skilled human capital (Corbetta and Mazzola,1989; Centazzo, 2002). However, the recent pandemic has accelerated this digital transition process. Even in Italy, more and more companies have invested in R&D to increase the production process's automation level and improve their digital capabilities (Lombardi, 2021; Fissi and Grazzini, 2021).

To prepare a comprehensive analysis of the context, the authors considered two main indicators' trend: the Digital Economy and Society Index (DESI)[1], and the Digital Intensity Index (DII)[2].

The analysis compared the above-mentioned reports refering to 2020 and 2022

In the analyses proposed in the 2020 edition, a 2019 updated snapshot of the state of digitalization of Italian companies is depicted, compared to the

[1] Digital Economy and Society Index (DESI) is thus a synthetic index to measure the progress of EU Member States toward a digital economy and society, based on a set of indicators considered relevant for assessing the implementation of the Digital Agenda for Europe. DESI consists of five main dimensions, which together represent over 30 indicators.

The five dimensions are: Connectivity: how widespread, fast and reliable broadband and ultra-broadband is in each EU country. Human capital/Digital skills: the digital skills of the population and the workforce Internet use: the use of the Internet in everyday activities, from reading the news to banking and shopping. Digital technology integration: how companies integrate key digital technologies such as e-invoicing, cloud services, e-commerce, etc. Digital public services: e.g. public administration digital services and digital health.

[2] Digital Intensity Index (DII) measures the availability at the enterprise level of 12 different digital technologies. The 12 technologies considered are: the use of the Internet for at least 50 percent of people employed; the use of Information and Communication Technology (ICT) specialists; the application of fast broadband (30 Mbps or higher); the implementation of mobile Internet devices for at least 20 percent of people employed; the creation of a Web site or homepage; the equipping of the Web site with sophisticated features; use of social media; sharing electronic supply chain management data; use of Enterprise Resource Planning (ERP) software packages; focus on Customer Relationship Management (CRM); e-commerce sales representing more than 1 percent of total sales; and, finally, business-to-consumer (B2C) web sales constituting more than 10 percent of total web sales.

European situation. This study focused on the SME sector, highlighting a significant under-digitalization of Italian SMEs compared to the European average.

In the DESI 2020 report, Italy ranks 25th out of twenty-eight EU member states, ahead of only Romania, Greece and Bulgaria. Specifically, it is the variable "human capital" that causes a drastic lowering of Italy's level of digital competitiveness, ranking Italy as last compared to all other European countries, only 42% of people (between 16 and 74 years old) possess basic digital skills against a European average of 58% and a peak in Germany of 70% (DESI, 2020).

The Italian position does not improve if considering the "integration of digital technologies" dimension, registering, even in this case, an average well below the European one that sees the country in 22nd place out of twenty-eight.

Similarly, when analyzing the report proposed by Eurostat in the Digital Intensity Index (DII) 2020, which measures the entrepreneurial availability of twelve different digital technologies, Italy ranks twenty-first, revealing that about 40% of Italian companies would have made modest investments in digital technologies, owning less than three of the twelve technologies monitored (DII, 2020).

Specifically, about 82% of firms with at least ten employees are at a "low" or "very low" level of ICT adoption, not being co-involved in more than six of the activities considered; the remaining 18%, on the other hand, perform at least 7 of the 12 functions, ranking at "high" or "very high" levels of digitalization.

It emerges that firm size and organizational complexity align with the varying firms' digitalization level, which also differs in the type of technologies implemented. Italian firms with at least one hundred employees base their digitization process predominantly on the use of technologies such as the mid-to-high-level cloud, the workforce's use of computers and mobile devices, and the presence of ICT specialists. On the contrary, more advanced technologies, such as robotics, Big Data, or 3D printing, are mainly used by companies that have already implemented the aforementioned innovative tools; therefore they can boast of a higher level of digitalization (DII, 2020).

PMI LAB, a national observatory that investigates digital transformation processes in the vast landscape of Italian SMEs, in an analysis conducted in 2019, highlights the areas mainly interested in digitalization in the pre-pandemic period: internal organization and customer service and care.

This situation, however, has changed in the post-pandemic scenario (DESI, 2022; DII, 2022).

At the end of a year that saw the grounding of the first projects and the missions of the PNRR, the most conspicuous recovery and resilience plan among those adopted at the European level, Italy's overall position in the DESI improved, ranking 18th out of the 27 member countries (20th in 2021, and 24th in 2020, when the index was still based on the Europe of 28 including the United Kingdom).

However, the human factor is what mainly penalizes our country: compared to 2019, Italy still ranks third-last in Europe, with more than half of its citizens missing basic digital skills (46% of Italian citizens possess them, against a European average of 54%).

At the same time, only 15% of Italian companies provide ICT training to their employees, 5% below the EU average.

The situation is quite different about connectivity, where Italy climbed the rankings from 23rd to 7th in one year, with a score of 61.2, against a European average of 59.9.

Italy's position also improved with regard to the integration of digital technologies, where our country ranks 8th in Europe, gaining two places compared to 2020.

The performance of our SMEs is good, most of which have at least a basic level of digital intensity (60%, above the EU average of 55%), with significant differences compared to the other Member States (from 86% in Sweden and 82% in Finland to 25% in Bulgaria and 22% in Romania).

Thanks to legislative interventions, 95% of Italian companies use e-invoices. The country also scores well in adopting cloud services, with 52% of enterprises using it (above the EU average of 34%).

The use of ICT technologies for environmental sustainability is also relatively widespread in Italian companies, although lower than the EU average (60% against an EU average of 66%). The use of Big Data is low (used by 9% of Italian firms compared to an EU average of 14%), as is the use of Artificial Intelligence-based technologies (6% of Italian firms compared to an EU average of 8%). E-commerce adoption increased between 2020 and 2021, reaching 13% but remaining below the EU average (18%).

The analysis of the DII 2022 confirms substantial progress in enterprises' digitization, including Italian SMEs, 70% of which register for basic-level digitization.

The composition of the DII changes yearly to update current trends, hence the comparison between 2020 and 2022 can not be homogeneous. Indeed, the 12 targets of the DII 2022 are considerably oriented towards ICT security, to the detriment of some of the targets of the DII 2020 (e.g. use of ERP

systems, CRM systems, sophisticated cloud services), which would be just as crucial for defining the level of digitization of enterprises.

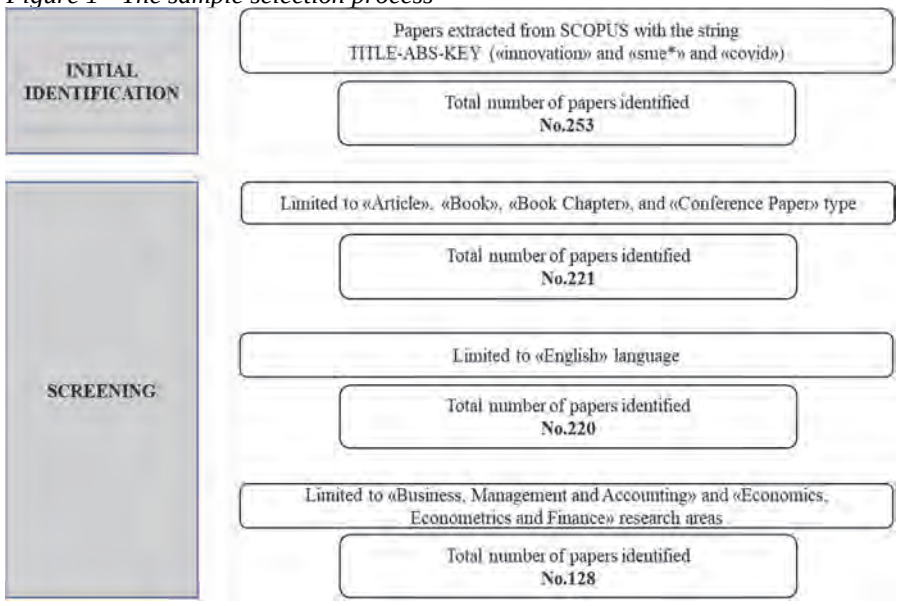
However, Italian SMEs show the most significant progress on the parameter of employee internet access for work purposes (49%). And on the use of remote business systems (73%), at least 3 ICT security measures (74%), and broadband access (83%) also show comforting numbers.

Concerning online sales, the 2022 figures do not show any improvement in the share of companies involved, but only in the values exchanged: 13% of SMEs made online sales for at least 1% of total turnover (down from 12.7% in 2021) against 17.9% of European SMEs. However, among Italian SMEs doing e-commerce, the percentage of turnover achieved online as a percentage of the total rose from 9.4% last year to 13.4%. In general, 18.3% of Italian companies with at least 10 employees made online sales (the European average is 22.8%).

3. Methodology

To answer the RQ1, the authors resorted to an SLR (Serenko, 2021; Paoloni and Demartini, 2016), a more and more popular methodology in business studies (Rocco *et al.*, 2023; Dal Mas *et al.*, 2023), that requires a rigid protocol based on its validity (Petticrew and Roberts, 2008) and reliability (Yin, 2009) and a strict description of how the process happened. The authors extracted the results from the SCOPUS database, considered the most comprehensive database (Del Vecchio *et al.*, 2022; Paoloni and Manzo, 2023). The starting string was TITLE-ABS-KEY ("innovation" AND "SMEs*" AND "COVID"). The research was carried out on 29 March 2023 and 253 studies resulted, but the sample was further reduced by imposing additional filters. As for the type of documents, only articles, books, book chapters, and conference proceedings (Paoloni *et al.*, 2020b) were considered (namely 221 of the original set). In addition, to overcome linguistic problems (Mauro *et al.*, 2017), the authors selected only the papers in English (220). Furthermore, as the SLR wanted to maintain an economic perspective, the authors focused on two research areas: Business, Management and Accounting; and Economics, Econometrics and Finance (128 results). Figure 1 shows the sample selection process (Paoloni and Manzo, 2023; Paoloni *et al.*, 2020a).

Figure 1 - The sample selection process



Source: Authors'elaboration

As previously mentioned, SLR requires the application of a valid framework. The present study uses the one Paoloni and Demartini (2016) introduced and classifies the papers according to four lenses: Article Focus (A), Research Area (B), Geographical Location (C), and Research Method (D). To answer our RQ1, findings will focus only on the article focus analysis. However, the complete review is attached in Appendix (www.sidrea.it/impact-pandemic-crisis).

To reply RQ2, the authors focused on the direct observation of two Italian firms, representing the pilot cases of a future broader and deeper research. The research uses a qualitative methodology particularly suitable when the analysis examines in-depth events of operational reality, attempting to explain "how" and "why" a given phenomenon occurs and explaining the causal links between the variables involved in the course of its manifestation (Yin, 2009). In the present work, the authors begin to move the first steps to comprehend which questions can be useful to ask and how to elaborate on the case study in further research. Therefore, they selected two small businesses and observed specifically to it the new needs that emerged after the pandemic and the implemented digital process. The firms under analysis were selected based on the following criteria. First, they operate in the food

service sector, which is an interesting sector to consider regarding how COVID impacted it. Indeed, on the one hand, distribution and commercial activity were abruptly halted by the pandemic crisis that forced them to reshape, minimizing physical displacement according to the mobility restrictions imposed. On the other hand, representing necessities, the demand for food has not decreased despite the pandemic. Second, while operating mainly on a regional basis, both companies also distribute their products to neighbouring regions, so a mobility restriction undoubtedly significantly impacts the business model. The first one, located in an upper Lazio province, distributes its products in the regions of Lazio, Tuscany and Umbria; the second one, located in Abruzzo, also serves Marche and Molise. Finally, the company were chosen because of their proximity to the researchers, making obtaining valid and in-depth information easier. Data were collected through an unstructured interview with the company's CEO. The following elements were sought to shed light on during the interviews. At first, the authors asked for general characteristics of the companies and the entrepreneurs to contextualize the businesses; after that, the interviews aimed to comprehend specific elements inherent in the level of digitalization of the company, comparing the pre-pandemic and post-pandemic phases.The interviews started in January 2022, however the entrepreneurs have been further consulted to preserve the work's reliability and completeness during the paper's elaboration.

Figure 2 - Unstructured questionnaire outline

COMPANY DETAILS AND PERSONAL PROFILE OF THE ENTREPRENEUR
Main technological tools used Needs satisfied through the use of technology Digitized business areaa
DIGITALIZATION PRE-PANDEMIC PHASE
Main technological tools used Needs satisfied through the use of technology Digitized business areaa
DIGITALIZATION POST-PANDEMIC PHASE
New strategic needs emerged during the pandemic New technological tools implemented after the pandemic New digitized business areas

Source: Authors'elaboration

3.1 Conceptual Framework

The theoretical framework for conducting the empirical analyses in our research project follows the framework proposed by (Paoloni, 2011; Dewey, 1974).

This envisages a succession of phases: planning, experimentation and rationalization.

In the planning phase, the theoretical framework is defined to clarify the topic's doctrinal and empirical aspects.

This phase includes the development of the theory and general cognitive objectives; the selection of the case study; the design of the data collection; the writing of the individual case; the analysis of the data; and finally, any modifications to the theory and any contradictory reports.

The experimentation phase is the operational phase of the case study in which data collection is carried out by choosing the sources that best fit the chosen methodology.

Finally, in the rationalization phase, the collected data is observed and processed.

4. Findings

4.1 The main Article Foci in the extant literature

To reply RQ1, the authors report the article foci identification; however, in Appendix the full framework and the complete analysis are exposed.

Figure 3 - The article foci

A. Topic
1 - Industry 4.0 and new technologies
2 -Performance
3 - Innovation management
4 - Resilience
5 - Other

Source: Authors'elaboration

4.1.1 Article foci's analysis

The literature investigates how the pandemic crisis impacted the SMEs' innovation process by adopting different perspectives. In light of this, the authors identified the following article foci.

A1. Industry 4.0 and New technologies

Literature involved in this class comprehend studies focused on the implementation in SMEs of the new technologies characterizing Industry 4.0. Previous studies have recognized that obstacles to digitalization have different natures: technological, organizational or environmental (Ghobakhloo *et al.*, 2022). The former comprehends the high cost of technologies, such as costs of hardware, software and underlying systems (direct costs), the expenses companies have to bear repeatedly to keep the technology in operation, or consultancy costs (indirect costs). Scholars find that despite becoming more affordable in recent years (Rauch *et al.*, 2019), SMEs still struggle to cover the direct and indirect costs of acquiring Industry 4.0 enabling technologies (Kumar *et al.*, 2020; Masood and Sonntag, 2020).

The literature recognizes that during the pandemic crisis, as a reasonable response to the need to strengthen ties with a distant market in a period of forced social estrangement, SMEs have accelerated their investments in communication technologies such as websites, social media, and e-

commerce or information systems to develop customer relationship management activities (Penco *et al.*, 2022; Culasso *et al.*, 2022), to maintain efficient operations and lower costs (Al-Okaily *et al.*, 2022). For instance, the implementation of cloud-based accounting allowed SMEs to improve their efficiency, financial organization, and flexibility (Al-Okaily *et al.*, 2022); the use of information and communication technology (ICT) made easier the passage to remote work (Jorge *et al.*, 2021); also the access to digital financial products contributed to greater financial inclusion for SMEs in a period when their possibilities where even stricter (Nugraha *et al.*, 2022).

A2. Performance.

This rank counts the studies specifically focusing on the impact of the pandemic on SMEs' performance.

Digitalization constitutes an important source of innovation, generally definable as the modification of specific variables in firms' practices to improve performance (Curristine, 2006) and represents one of the main driving forces of corporate competitiveness (Aramburu and Sáenz, 2011). Hence, these technologies facilitate operational efficiency, increase productivity, improve control processes, optimize inventory and reduce lead times, errors, costs and energy waste (Liao *et al.* 2017).

Some studies focus on the financial performance, confirming the positive impact, during the COVID-19 pandemic, of processes innovation on financial performance (El Chaarani *et al.*, 2022; Gerth *et al.*, 2021).

Further research recognizes that the increased digital innovation capability, like it happened during the pandemic, can lead to better innovative performance (Kő *et al.*, 2022; Anuntarumporn, 2021).

However, in the post-pandemic context, SMEs have been under pressure to make their recovery operations and processes environmentally sustainable and digital tools could help them (Choudhary *et al.*, 2022; Syarief, 2021)

A3. Innovation management.

This class involves studies focused on the organizational change that enterprises have to face to carry out an innovation process. Most of the studies are about open innovation, people management, human and social capital (Crupi *et al.,* 2020; Moro Visconti, 2020; Nielsen and Montemari, 2021, Soni *et al.*, 2022). Embarking on a digitalization process requires not only a monetary investment but a managerial commitment to equip the company with the knowledge and skills to make decisions and develop practical organizational approaches in the new business 4.0 contexts (Garzoni *et al.,* 2020). However, the transformation process does not have to be drastic, it can be implemented gradually and at different levels of changes (Priyono *et al.*, 2020).The digital transition is a profound transformation involving many

aspects of a business organization regarding the business model, much more oriented to the customer engagement, organizational culture, processes, and employees' habits and competencies (Marchini *et al.*, 2019; Alfiero *et al.*, 2018; Matarazzo *et al.*, 2021; Chamochumbi *et al.*, 2022). These variables have to be changed to fully leverage the opportunities provided by digital technologies and their accelerating impact (Culasso *et al.*, 2022).

A4. Resilience.

This cluster gathers all the studies recognizing the value of an innovation process as a means not only to survey on a disrupting scenario, but to develop a competitive advantage.

These technological upheavals spill over to a broader reality in the guise of 'creative destruction' (Schumpeter, 1976), not only transforming the production process but going so far as to upset the balance of markets through a Darwinian elimination of firms unable to innovate. The pandemic was a disruptive environmental factor (Laato *et al.*, 2020) even for SMEs belonging to traditional sectors with little or no experience in Industry 4.0 (Soto-Acosta, 2020), which were obliged to accelerate the adoption of digital transformation as the only means to avoid short-term economic collapse and boost their resilience (Soto-Acosta, 2020) and reimagine their business model to rebuild new competitive advantages in the new market (Amankwah-Amoah *et al.*, 2021; Wenzel *et al.*, 2020). The crisis caused disruption that brought new opportunities for renewal, triggering a mode of thinking that allowed managers and employees to push the boundaries of what they thought was thinkable and feasible (Wenzel *et al.*, 2020), and especially SMEs to think out of the box and rediscover themselves in unprecedented ways (Zutshi *et al.*, 2021). With reference to the relationship with the external environment, on the other hand, it is clear how digital technologies foster more immediate and effective communication with stakeholders, resulting in the possibility of establishing a closer relationship of trust with them and greater visibility in the market (Agostini and Nosella, 2019; Masood and Sonntag, 2020).

A5. Other

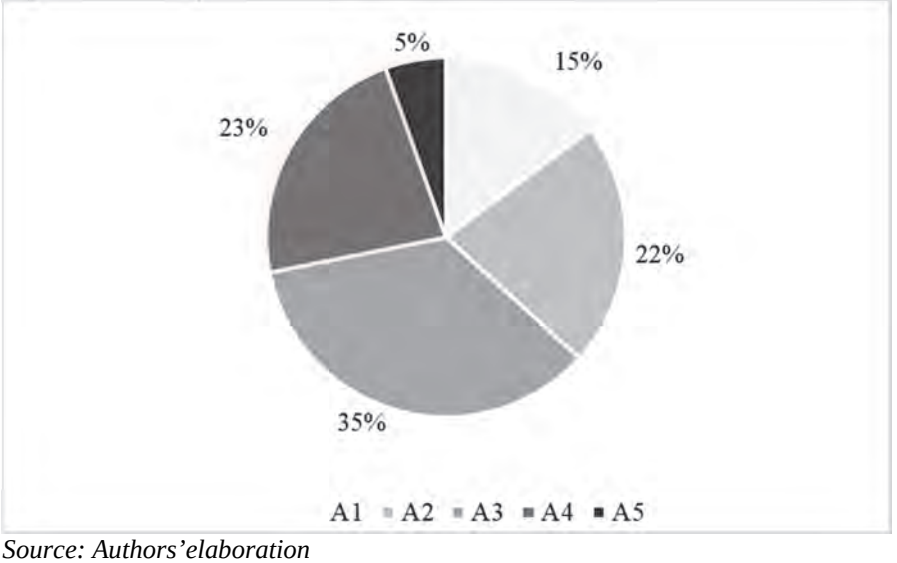
This residual class includes studies that the author does not attribute to the categories mentioned above as dealing with topics that are not treated enough to constitute an independent category or not strictly relevant to the research topic, therefore difficult to contextualize.

4.1.2 Article foci's distribution

As it is shown in Figure 4, the broadest category gathers papers about Innovation management (A3) representing 35% of the sample (45 papers). The second broadest category involves studies focused on the SMEs'

resilience (A4), representing 23% of the sample (29), but it only contains one more work than A2, analyzing how the pandemic affected SMEs' performance and representing 22% of the sample (28). Finally, A1 deepens the new technologies characterizing Industry 4.0 and accounts for 15% of the total (19). As for the "other" cluster, A5, it only represents 5% (7).

Figure 4 – Article foci's distribution



Source: Authors' elaboration

As the literature analysis shows, several studies have focused on the changes in tenors that SMEs must implement to implement the new tenets efficiently. The efforts to adopt Industry 4.0 technology are more likely to fail if SMEs do not have the necessary capabilities to develop and implement a strategy and plan for digitalization. In addition to technological factors, organizational drivers and barriers must be considered, namely the knowledge and skills required for digitalization (Ingaldi and Ulewicz, 2019). An efficient implementation of new technologies also depends on the value chain in which that company is embedded in terms of the willingness of business partners, suppliers and customers to accept Industry 4.0 technologies and the resulting smart products (Ingaldi and Ulewicz, 2019). What the firms need is holistic and cultural change. These changes are not always and not only subsequent and consequential to the implementation of technologies. Indeed, sometimes they are, on the contrary, exigencies and needs that are already present in the organization, leading it to seek new tools to satisfy

them. This happened during the pandemic crisis, which in some cases has emphasized some specific needs already present in some companies, fostering a digitalization process already in progress. In other enterprises, instead, the pandemic has generated some needs that were new or that had never been felt by the organization, leading it to begin an innovation process.

In light of this, we wanted to analyze how this process happened in two different case studies through which we wanted to answer the question *RQ2- What new needs arose during the pandemic fostering digitalization?*

4.2 The pilot case

This section discusses the responses provided by the entrepreneur of the selected company to the unstructured questionnaire submitted.

4.2.1 Company details and personal profile of the entrepreneurs

Two Italian SMEs active in the food services sector were selected. The first (A) is a family business organized in corporate terms as a Limited Liability Company (LLC). It is a commercial enterprise specializing in the supply of fresh, ambient and frozen food products, which stands out in the food service sector, particularly in the hotel-restaurant-cafeteria (HORECA) segment. In addition, the small company is active in the food distribution sector in Lazio, Tuscany and Umbria regions. The operational business model is based on the activity of order collection, which sales agents carry out; subsequently, transporters take care of the delivery of the goods. Danilo, the managing director, is 58 and has been at the company's helm for about 25 years.

The second (B) is an LLC too, which deals with the marketing of fresh, ambient and frozen products in the regions of Abruzzo, Marche and Molise.

Compared to A, the main channel of activity is retail. Similarly to A, B is organized through its internal logistics for delivering goods and a team of agents acting on the market using the order collection method. B has also recently activated the export channel, dealing with the supply of specific food products to wholesalers worldwide. Silvia, the entrepreneur, manages it together with her husband.

The profiles of the two entrepreneurs are similar, as is the company organization. What contrasts are the business lines implemented, since the former is mainly oriented towards the HORECA segment, whereas the latter with a turnover mainly developed in the retail channel. Both SMEs aim to

develop and expand each agent's customer base, aiming to increase monthly turnover with a sustainable sales margin.

Figure 5 - Descriptions of interviewees

	Name	Age	Marital Status	Children	In-dustry	Target markets
1	Danilo	58	Married	Yes	Food services	Italy (HO.RE.CA)
2	Silvia	53	Married	Yes	Food services	Italy (Retail) + Export

Source: Authors'elaboration

4.2.2 Digitalization in the pre-pandemic phase

From the interviews, the digital progress of the two pre-pandemic SMEs is rather aligned. Even before the pandemic crisis, both companies state that they went through an initial phase of digital evolution to automate some internal processes and adapt their business to alternative bureaucratic impositions, such as electronic invoicing. Specifically, the main areas digitized pre-pandemic for both companies were internal processes, with the digitization of document flows, communication and marketing. Both companies were already equipped before the pandemic with a basic technological infrastructure: fixed PC workstations, portable laptops, palmtops for agents, company servers, wi-fi connection and a single company software for the integrated management of operational activities. A few months before the pandemic, both SMEs implemented a new business management system, planned and coordinated by an external company, with file access systems and user authentication mechanisms that preserve sensitive information. Moreover, the technology platforms supporting the business processes are characterized by a homogeneous and integrated user experience, regardless of the device, desktop or mobile. On the one hand, this makes it possible to streamline operations by reducing manual steps (and thus errors), however, it ensures greater control and transparency over the execution of each activity. This is a single business management system on which operations are carried out from the moment the order leaves for the supplier, enters the warehouse and is validated on entry through to the invoicing of outgoing goods. It makes it possible to have a fiscal warehouse and thus ensures fiscal and batch control tracking of goods in stock. Both SMEs were also already equipped with a business intelligence (BI) system for performance management, an analysis dashboard accessible by both top management and individual salespeople to self-monitor their business. Both companies analyzed pre-pandemic also had

a digital marketer, under 30, internally responsible for developing the company website and managing social communication on the various Instagram, Facebook and Linkedin profiles. Danilo stated that his company's internal data before COVID-19 were on internal servers; whereas Silvia stated that she had already implemented a cloud infrastructure years ago with a contract signed with a provider for a hybrid cloud service. Both administrators were thus already aware that an ineffective and inefficient technological infrastructure produced many organizational and functional problems, with high maintenance costs and an enormous dispersion of human resources.

4.2.3 Digitalization in the post-pandemic phase

When the pandemic crisis occurred, both companies underwent a major organisational change: about 40% of the staff, in both cases administrative, bureaucratic, marketing and insurance employees, started working remotely, from home, due to the restrictive measures. For both entrepreneurs, the main objectives therefore became the automation of operational processes to achieve speed and security in the execution of business activities, implementation of tools to ensure remote operation, food traceability and integrated data management.

Based on their different business models, the needs that emerged for the two SMEs during the pandemic were opposite.

The first company (A), in fact, deals mainly with supplies in the HORECA segment, a sector heavily affected by shutdowns and lockouts. This forced the need to implement alternative sales channels to diversify the offer, so an e-commerce platform was designed to allow anyone interested to purchase products from the comfort of their home. Post-pandemic investments were therefore strongly geared toward perfecting the shopping experience for the online user. Danilo, therefore, stated that:

> "*this was an important strategic change, as the main pre-pandemic sales activity tended to take place through an intermediary, the salesperson; in this case, it was possible to reach the customer directly and thus acquire relevant data on the sales experience*".

To meet the need for flexibility, company (A) also moved all its data from physical servers to a cloud infrastructure through a private cloud contract signed with a major provider. Danilo says that this allowed them to keep all their employees who were forced to work at home operational and benefit from economic and operational advantages:

"Through this innovation, all our workers had access to their desktops remotely and worked on shared files easily. The cloud has enabled my employees to improve their collaboration with access to data, even big data, anytime, anywhere and real-time updates. The introduction of the cloud has proven to be the most cost-effective choice for managing and upgrading the IT infrastructure, in fact, migrating services to the cloud has allowed us to convert capital expenditure into a variable cost; instead of investing massively in server hardware and software, you pay when you consume computing resources and only for the amount you consume".

These are the main digital advances made by the first company under study.

The second SME (B), on the other hand, developing most of its turnover in the retail channel, a sector less impacted by the closures and blockades imposed during the pandemic months, on the contrary, measured a strong growth in turnover and a strong increase in demand due to the compulsive demands for food supplies. To meet this new demand, Silvia invested part of the funds in the implementation of transport optimization software.

"This tool allowed each hauler, knowing the number of deliveries to be made and the location of each shopkeeper, to quickly identify the route that optimizes in terms of kilometers to be traveled, estimated traffic in the hours ahead and distance from the storage warehouse, the best route to take".

To speed up and make communication both internally and externally more efficient, company (B) also implemented marketing automation software that allows the automation of certain repetitive marketing activities, which can be included in the demand generation process.

"We have implemented software that makes it possible, for example, to send e-mail marketing with predefined and differentiated deadlines for different target customers, to track those who visit our website, and to submit inquiry forms to anyone who lands on our site".

Both companies analyzed (A) and (B), as a result of the technological implementations carried out, had to invest in enhancing the skills of individual workers and increasing IT security through the installation of a Virtual Private Network (VPN), i.e. a virtual private network that guarantees

privacy, anonymity and security through a logically confidential communication channel. Danilo reveals that he had access to training courses on the use of the cloud provided by the provider who provided the installation service. It was a course attended by all the teams of workers who operationally use such tools, delivered by engineers and it specialists who, after a comprehensive introduction and explanation of the cloud and the different types of existing clouds, stimulated employees on the different alternative uses of the tool to maximize its use. Similarly, Silvia states that they needed to introduce a new IT manager in early 2022. This is an IT engineer who oversees the proper functioning of all digital infrastructures, intervenes promptly in the event of malfunctions and is dedicated to the study of innovative software that fits the company's needs. Both respondents state that they maintained and if possible developed the digital implementations activated during the pandemic. Company (A) developed the e-commerce channel, devising online shopping guide videos directly for the end user and personalized shopping experiences via instant messaging chats. To date, about 4% of its turnover is generated through the online channel. Danilo provides quarterly training and refresher courses for his employees and hopes to be able to add an IT competence figure soon, to rationalize consultancy expenses towards external parties. Company (B) also maintained and consolidated the innovations made during the pandemic period, declaring a positive impact of these changes on the general organization and business efficiency.

From an organisational point of view, after the period of closures and restrictions, both companies reinstated work at their offices. In company (A), a flexible mode with 3 days per week in presence and 3 days of remote work was introduced. In company (B) only one day per week of remote working is allowed.

In conclusion, it emerges that the two companies, despite having rather similar distinguishing features and despite operating in the same sector, but in different customer segments, took advantage of the need for organizational change dictated by the pandemic crisis to implement digital development. The main needs that have arisen as a result of the pandemic are flexibility, connectivity, security and diversification.

5. Discussion and conclusion

The digital revolution has globally impacted the balance of the Italian entrepreneurial system, forcing companies to review their business models (Paoloni *et al.*, 2021; Giannetti *et al.*, 2021). Production systems, workflows,

and business organization have thus been transformed by the advent of new technologies that, when integrated into processes, generate numerous benefits such as improved business performance, optimized connectivity, increased productivity and profitability and greater flexibility. The Italian business fabric is predominantly made up of SMEs, so the country's digital evolution assumes that the small business sector mainly embraces the digital transition and is, therefore, willing to invest in this direction. Literature has been widely investigating the impact of the pandemic crisis on the innovation process of SMEs adopting different perspectives. In light of this, the study aims to answer the following research questions (RQs).

RQ1: What main foci can be identified in literature facing the impact of COVID on the SMEs' innovation process?

RQ2: What new needs arose during the pandemic fostering digitalization?

To answer RQ1, an SLR has been conducted, focusing the analysis on the main article foci that emerged from the sample extracted. The SLR brought out four main topics. The most numerous studies analyze the organizational changes necessary within SMEs to support the digitization process resulting from the pandemic or emphasized by it (Moro Visconti, 2020; Nielsen and Montemari, 2021, Soni *et al.*, 2022). In close correlation to this theme, it is not surprising that the second most numerous category envolves the studies underlining how the digitization process has represented a resilience tool for SMEs, supporting them in the development of new competitive advantages and in an attempt to reduce the entrepreneurial gap suffered with larger companies (Amankwah-Amoah *et al.*, 2021; Wenzel *et al.*, 2020). Indeed, in third place, there is the cluster containing those studies that analyze the digitization impact on the SMEs' performance levels, underlining both the positive and negative effects (Kő *et al.*, 2022; Anuntarumporn, 2021). Only a few studies strictly concern the technical characteristics of the implementation process of new technologies and the specific tools that companies use (Kumar *et al.*, 2020; Masood and Sonntag, 2020). The SLR, therefore, made it possible to identify a theoretical pattern that the authors wanted to explore more in-depth leading to RQ2.

In order to answer RQ2, the authors focused on the direct observation of two Italian firms, which represent the pilot cases of a future broader and deeper research.

In light of what emerged from the literature analysis and confirmed by the case studies, the pandemic crisis sometimes emphasized particular specific needs already present, favouring a digitization process already

underway. In other cases, it generated new or previously unnoticed needs, leading to begin an innovation's process.

The interviews conducted with the two selected companies revealed some specific opposing needs that arose as a result of the COVID-19 pandemic, depending on their business model but also new common needs: connectivity, flexibility, security and digital training of personnel.

The two selected companies are SMEs active in the food services sector, with two different target customers: HORECA (A) and retail (B). The pandemic destined two opposing fates for the two companies during the months of the health emergency. A suffered a drastic drop in turnover due to the forced closure of restaurants, bars and pastry shops; B experienced a sharp increase in turnover and, therefore, in sales dictated by the compulsive rush to stock up on food at supermarkets and convenience stores which characterized the first few months of the pandemic. In response to this contrasting context, the solutions devised by the companies, and thus the technological innovations made, also diverged. A worked on the implementation of alternative sales channels, such as e-commerce, and the migration of data to a cloud platform, whereas B invested in task optimization and software automation. Both companies invested in the employees' digital training to increase their core competencies.

This paper aims to contribute to enriching the economic literature on the impact that the pandemic has caused in the business world, with specific reference to SMEs and the process of technological innovation they underwent or initiated. The research highlights the limitations, obstacles, but also opportunities that SMEs interface with in implementing a digitization process. Exploring them it is possible to increase small business owner's awareness about the new consumer and business needs, born with Industry 4.0 and exacerbated as a result of the advent of the pandemic. The main critical areas where it may be more cost-effective to invest in order to foster a digital transformation that makes the production process leaner and more competitive; and the collateral structural and organizational changes needed to support efficient change. Among the main limitations of the research there is the small amount of case considered, only two, which does not make the results generalizable for all SMEs operating in agri-food. However, this research is intended to begin a broader analysis that will consider other enterprises to validate the results that emerged.

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