

## Article

# Sustainability of Romanian Small and Medium Enterprises Using the Electronic Signature as a Driving Digital Tool

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**Abstract:** The new motto of our society is sustainability through digitalization. The trend towards digitalization of enterprises is indeed a form of sustainable development. Within the European Union, policies are drawn up, and actions are undertaken to contribute to the creation of a sustainable, high-performing economy. Business performance today is also associated with digitalization, i.e., with the use of digital tools. The widespread use of digital tools in the economy also depends on their implementation by Small and Medium Enterprises (SMEs), which have a significant weight in the economy of each country member. This study addresses this issue of widespread use of digital tools by Romanian SMEs. The purpose of the study is to determine the impact and relevance of the use of digital tools, more precisely the use of the digital signature, on Romanian SMEs, and what are the impediments to the use of the digital signature for all documents, “on a large scale”, in any situation (a SWOT analysis was carried out that highlights the constraints and limitations, but also the factors that are advantageous and determine the use of the digital signature by SMEs). The research was based on two related studies: the first investigation covers the use cases of digital signature within the community of Romanian SMEs, while the second study reflects on the use of digital signatures by Romanian SMEs, from the perspective of the commercial certified trust service providers from Romania. Quantitative and qualitative methods were used, which provided many interesting results. Thus, it was found that companies with a short and those with a long presence in the market use the digital signature less than those with an average one, and the most important advantage of using the digital signature is the reduction in time, in second place being the reduction in costs. The study also reveals that the biggest barrier to the widespread use of the digital signature is the lack of information and know-how, which is why we considered it appropriate to carry out this study. The results of the study are discussed considering today’s increasingly digitalized context. This study enriches the specialized literature with information on the use of digital signatures by Romanian SMEs.



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## 1. Introduction

Sustainability in the context of SMEs means that they need to have the strategy and ability to maintain themselves as competitive for a long time while consuming resources as carefully as possible, without exhausting them and without degrading the environment. It is a form of respecting our future generations [1]. Sustainability is synonymous with adapting to the environment in which you live [2].

If in the past, enterprises used to manufacture goods and deliver services in physically existing markets, where sellers and buyers could actually meet in person, today, digital technologies have transformed the old commercial economy into a digital economy, with digital markets where customers are active online, products and services are available online, and sales and purchases are conducted online [3–6].

The COVID-19 pandemic, which we have barely overcome, has shown us how dependent is human society on technology, solutions, and information systems to help us overcome the challenges of the 21st century [7,8].

Building Back Better, or BBB, is a popular phrase that emerged after the disastrous consequences of the 2004 Indian Ocean earthquake and tsunami. It refers to the stage of reconstruction and recovery after a disaster and represents an opportunity to introduce newly available ideas, technologies, and methods, which contribute to an improved reconstruction of what once was, and not only that. International research has shown that BBB approaches are acting in three directions: (1) reducing the risks of disasters, of education deficiencies, and focusing on early warning for the community; (2) economic and psycho-social recovery of the affected communities; (3) effective implementation of institutional mechanisms, but also proactive monitoring and evaluation to achieve efficient and effective recovery [9]. In this post-COVID-19 period, we are laying the foundations of the BBB plan, moving on to the Great Reset. After the COVID-19 pandemic, during the climate crises but also the social crises that existed before the pandemic, and which left the world less sustainable, and increasingly more fragile, it is necessary to build new economic and social systems [10]. The pandemic demonstrated that companies and individuals were forced (almost instantly) to abandon some essential practices of the past: first and most affected was physical work from the office and frequent travel for personal or business interests [11–13]. This was a clear example of a black swan event that determined the unprecedented development of the digital society of today, where digitalization invades our personal life, but also the public domain with all its economic areas, the national health, educational and many other systems [14].

Romanian small and medium enterprises represent 99.7% of all Romanian companies and employ 65.8% of the Romanian active population [15]. Durability and resilience of these SMEs means their ability to keep up a competitive profile, and to evolve their business activities over time, protecting the environment and efficiently managing resources [16,17]. The environment in which Romanian SMEs must operate and develop today is a highly digitalized environment [18].

Digitalization provides Romanian SMEs speed in action, in making and transmitting decisions, in running business processes [19,20]. The process is complex and requires resources [21], therefore SMEs can also apply for non-reimbursable financing for digitalization. A qualified human-resource reservoir and a flexible, innovative management system are required. Being a sustainable SME means using digital technologies, digitizing processes and activities, using digital tools to communicate, collaborate, promote, manage, and lead. Businesses and people have become aware of the necessity to move business and activities online, and they have grasped the impact which digitalization yields on productivity and growth [22].

Handwritten, holographic signatures have been used for centuries, but the need to communicate at a distance and the new technical devices that are always appearing required the introduction of an equivalent of the holographic signature, which can be used in the online environment [23].

The use of digital tools, such as the digital signature, by Romanian SMEs comes as a necessity to adapt to the digital environment [24] in which we live and work. It was also imposed by the context of the COVID-19 pandemic [25]. The pandemic lockdowns and disruptions have accentuated the challenges that SMEs faced even before the pandemic: financial risks, interruptions in the production flow, difficult access to external markets, and which could also be overcome by resorting to digital tools [26,27]. Digital tools are innovative elements, which, when properly implemented and deployed, usually contribute to a reduction in the resources used, and to the development of sustainable economic activities.

The electronic signature is a legal and fast way to sign documents in electronic format. It is used worldwide, is secure and can replace a physical signature on a paper document. The three immediate benefits of the electronic signature are: it is reliable (it is legal and applies everywhere in the world), it is efficient (documents can be signed and sent quickly

to the recipients), its associated costs are reducing resource consumption and waste (paper, fuels, mail, physical archiving, proper handling, and administration), etc. The use of the digital signature by Romanian SMEs is an important step on the road to digitalization, internationalization, and consequently for sustainable development. To be faster and responsive in communication, to send documents rapidly to partners and other companies and organizations, to save and recycle (paper, time, transport costs, etc.), but also to invest intelligently in digital technology (hardware, software, cloud storage, fast Internet connections, etc.), means to become visible, to count for current partners but also for future business partners [28].

The authors chose to investigate this topic for several reasons: they are passionate about digit(al)ization and its professional and personal impact and consequences (both in their workplaces and in their personal lives), they carry out activities that involve digital tools, including the digital signature (having experienced the advantages offered by its use), and they are involved in research activities regarding the digit(al)ization of Romanian SMEs, and educational institutions in Romania.

Regarding the choice of the title of this article, one favorable factor was the involvement of the authors in projects that entailed the establishment (starting up) of Romanian SMEs, carrying out of economic activities, and monitoring of business operations; all these would have been impossible to achieve without using digital tools. Thanks to connections with the representatives of the companies, but also with colleagues and with duties related to the management of the flow of documents, we deduced that the use of the digital signature was not understood properly and interpreted incorrectly (having witnessed how some people asked to duplicate the digital signature with the holographic one) or unfavorably (it was not usually used, and if possible, avoided as much as possible).

The digital signature made possible the transfer of information and documents for remote performance of activities during the pandemic, which led to the rescue of companies from bankruptcy, and to their development. Digitization has contributed to sustainable development of these Romanian SMEs. To observe more carefully, in more detail, what it means to implement the digital signature, what are the advantages, and what does its use involve, and to disseminate the advantages of using the digital signature, we chose to elaborate this article, in which we called on our experience in the field of digitalization and of the use of digital tools, which we combined with the experience of others (which we found in the specialized literature on the subject of digitalization, SMEs, digital tools, and the digital signature).

By elaborating this work, we wanted to popularize and highlight the fact that digit(al)ization improves the activity of SMEs and ensures their sustainable development, all this being achieved due to the fact that, through the use of digital tools and the digital signature, businesses connect, communicate and exchange information, products, and services, thus ensuring the satisfaction of most SMEs' needs.

With all this in mind, the authors set out to find an answer to the following questions: "Is the digital signature widely used by Romanian SMEs?", "What are the most common scenarios where the digital signature is used?", "What are the strengths, weaknesses, opportunities and threats regarding the use of the digital signature by SMEs?", "Is the policy adopted by SMEs in the field of digit(al)ization in line with the trends regarding the Single Digital Market strategy for Europe, as well as with those regarding the implementation of Romania's National Recovery and Resilience Plan (usually known as PNRR, which is the Romanian abbreviation)?", "What is the perspective of reliable service providers on the digit(al)ization of SMEs?", "How can the use of the digital signature ensure the sustainable development of Romanian SMEs?" and "How can SMEs be motivated to widely use the digital signature?" To obtain plausible answers, the purpose of the study is to determine the impact on and relevance to Romanian SMEs of the use of digital tools, and more precisely of the digital signature.

The work is structured in six sections. We give an introduction to the current context, then a synthesis of the scientific literature in the field, followed by the presentation of the materials and methods used in the elaboration of the study. It continues with the Section 4, where the results are presented, which are discussed in the Section 5. The final section represents the conclusions of this study, where the scientific contribution, impact, and relevance of the use of the digital signature, limitations and future research directions are highlighted.

## 2. Context and State of the Art

Research in the field of sustainable development highlights the importance of innovative technologies, new practices, and behaviors [29–33]. Part of the knowledge needed to face the challenges of the 21st century is already widespread in society, and good cooperation between businesses and civil society is needed more than ever, as they are active partners for future sustainable development [34].

The fourth industrial revolution is expanding through the implementation of technology-based operations [35]. To provide the best solutions for administration and society, permanent dialogue with the private, academic, and business environment is necessary. The digitalization of enterprises and the implementation of Industry 4.0 will accelerate the transfer of computing resources in industry, through the increasing use of robotics, artificial intelligence, and digital technologies [36].

A global ranking of digital competitiveness for the year 2022, places Denmark in first place, followed by the United States of America (USA) in second place, and Sweden in third place. This ranking reflects a country's ability to adopt and implement digital technologies in enterprises and public institutions. This ranking places Romania in the last quartile [37].

A study carried out at the level of the EU-27 countries, regarding the digitalization of small and medium-sized enterprises, reveals that the SMEs that most frequently use digital technologies are from the EU-14. There is a direct link between the gross domestic product per capita and the expenditures allocated by SMEs for research and development [38].

Europe's digital performance, and the digital progress recorded by the countries of the European Union, are reflected by the Digital Economy and Society Index (DESI). Starting in 2014, DESI created a digital profile for each country. The priorities and essential areas of digital development are thus identified. In 2022, the Digital Economy and Society Index indicates that the most digitally developed country is Finland, and the least digitally developed country is Romania [39].

The Digital Europe program offers funding for the development of five important areas: high-performance computers, cyber security, advanced digital skills, artificial intelligence, the implementation of digital technologies in the economy, and in society. This program aims to contribute to economic recovery and, through the digital transformation of the European economy, that of society, which will bring benefits to the whole society, but especially to small and medium-sized enterprises (SMEs).

The State Authority for Digitalization will offer Romania digital solutions that reach the citizen, to make interaction with public institutions as easy as possible. The degree of digitalization of the Romanian state is at 21% as of 2020. For the year 2030, the degree of digitalization of the Romanian state must be 100%, in accordance with the Digital Compass, which reflects the strategy of the European Union in the field of digitalization [40]. According to the White Paper on SMEs in Romania 2022, the business opportunities for SMEs in Romania in 2022 were the use of new technologies, the assimilation of new products and digitalization, for 34.31% of SMEs. The financing needs of SMEs are for areas such as investments in equipment, technologies (felt by 54.34% of SMEs), product development, services, but also accessing new markets (24.32% of SMEs). In 2022, the most important benefits obtained by SMEs due to the accessing of European Funds are the purchases of new equipment and technologies (77.64% of SMEs), but also business development in the field of research and innovation (53.04% of SMEs) [41].

The digital signature that was used the most during the pandemic cultivated among users a new lifestyle, new habits regarding approval, and safe validation of documents and online transactions [42]. The abandonment by a large Romanian retailer (eMAG.ro) of paper invoices and the introduction of digital signatures contributed to avoiding the generation of about 47 tons of carbon per year [43].

In 2023, Romanian SMEs will receive financing funds of two billion euros for areas such as digitalization, green energy, micro-industrialization, and recycling [44]. Through the National Recovery and Resilience Plan (PNRR), Romanian SMEs can obtain European funding to implement digital transformation solutions [45]. At the European level, SMEs represent 99% of enterprises, which provide two thirds of jobs in the private sector. Grants for SMEs are necessary to recover Romania's gap in the use of new technologies, which will generate increased competitiveness and enterprise innovation, facilitating new forms of work [46,47]. Establishing trust in the online environment is important for today's economic and social development, so that businesses, public authorities and consumers do not hesitate to conduct transactions electronically, or adopt new services. It is necessary to increase trust in electronic transactions, creating safe electronic interactions between businesses, citizens, and public authorities. This increases the efficiency of online services, both public and private, of electronic commerce, and of electronic economic activities. The *Digital Agenda for Europe* identified as obstacles to the implementation of the digital economy the fragmentation of the digital market, the increase in cybercrime, and the lack of interoperability [48]. Law no. 455/2001 establishes the legal regime of the electronic signature, as well as the conditions for the provision of electronic signature certification services. The document in electronic form, to which an extended electronic signature has been attached, based on a qualified certificate, and generated with a secure electronic signature creation device, is assimilated to the document under the private signature [49]. Statistical data from 2002 show that, since then, at the level of the European Union, 9% of households that had an Internet connection used electronic signature software [50]. The Digital Economy and Society Index (DESI) 2022 shows that Romania is at the beginning of the road regarding the construction of the digital economy and society [51].

Nicolescu et al. [52] carried out a study on the IT and digitalization of SMEs in Romania, which reveals that the most sought after software programs are business operating software, used by 87.37% of SMEs at national level. The second category of software programs used are those for the electronic signature and are used by 80.06% of Romanian SMEs, at national level. The same study reveals the fact that the percentage of SMEs that use digital signature software differs according to the development region, so that, for the Development Region of South-West Oltenia, the percentage is 80.99% of SMEs. Other software categories used by Romanian SMEs are business operation software, security software (25.54% of Romanian SMEs), sales software (25.39%), communication software (18.65%), software for enterprise resource planning (ERP), but also software for customer relationship management (CRM).

All the above shows that Romania is still at the beginning of the road in the field of large-scale digitalization of SMEs, and in the use of the digital signature as a digital tool.

### 3. Materials and Methods

#### 3.1. Data

We carried out two studies: the first on the business scenarios regarding the use of digital signature by Romanian SMEs and the second on the use of the digital signature by Romanian SMEs, from the perspective of the certified trust service providers based in Romania.

The first study concerns the use of the digital signature by 152 Romanian SMEs from the South-West Oltenia region. The respondents were members of the Body of Expert and Licensed Accountants of Romania (CECCAR—<https://ceccar.org/en/> accessed on 27 July 2023). The second study, aimed at the use of digital signatures by Romanian SMEs, was sent to digital signature providers in Romania. Of the five respondents, only one agreed to complete the questionnaire.

The elaborated questionnaires were based on the data elaboration and analysis methods described by Paradis et al. [53]. Respondents were invited to answer the questionnaire on a voluntary basis. They were informed in advance about the non-traceability of the answers, and about processing the collected data by respecting their confidentiality and anonymity.

The participants in the study represent approximately 51% (152/300) of the CECCAR members, and 60% (i.e., three out of a total of five) of the EU-acknowledged trust service providers based in Romania. The other two trust service providers did not respond because they probably did not have the necessary information structured in the form required by the questionnaire or did not have the time nor the interest to structure it. Moreover, aspects related to the questionnaire offered to suppliers were not identified in the specialized literature consulted either. However, we believe that the information provided can be valuable. The period in which the study was carried out was November 2022–January 2023. Questionnaire development, data collection, data analysis were all carried out using Google Forms [54]. A statistical analysis was also performed using the IBM SPSS platform.

The first questionnaire, the one intended for SMEs, has 12 questions and covers aspects such as the field of activity of Romanian SMEs, the age (market experience) of the enterprise, the frequency with which the digital signature is used, cases in which the SMEs use the digital signature, whether the digital signature improves their activity or not, and what are the advantages, disadvantages, threats and opportunities that arise as a result of the use of digital signature. There are also two questions regarding the policy adopted by SMEs in the field of digitalization and whether it fits both trends regarding the digital single market for Europe and trends generated by the implementation of the Romanian National Recovery and Resilience Plan (PNRR).

The second questionnaire addresses the Romanian-based digital signature providers. It has a number of eight questions and queries respondents for information on the percentage of SME customers out of the total number of customers; the types/categories of digital certificates most often requested by SMEs; the percentage of SME customers requesting a digital certificate valid for 1 year, 2 years, or 3 years; how many of the Romanian SMEs that use digital certificates renew their certificates; what is the share of SMEs in the total number of new customers for the year 2021; and what is the market trend in the digital signature field.

The first questionnaire has a mix of structured questions (58.3%—7 out of 12), and semi-structured questions (41.7%—5/12). The second questionnaire has a mix of structured questions (62.5%—5/8) and semi-structured questions (37.5%—3/8). Structured questions facilitated data processing, while semi-structured questions were selected for exploratory reasons. The semi-structured questions are important because they helped us to gain the opinions of the respondents, necessary also to extract specific information.

### 3.2. Methods

The work was structured in two parts, for both preliminary and fundamental research. Preliminary research used analysis of frequencies and standard deviation as methods of descriptive statistics. Basic research was conducted using the Chi-square test.

To obtain answers to the proposed questions, mixed research methods were applied. First, studying the specialized literature and the responses of digital signature providers, some uncertainties emerged regarding the use of the digital signature by Romanian SMEs and its influence on their sustainability. Then, the qualitative analysis used allowed the identification of some SWOT elements, as well as exploration of the perceptions of SMEs regarding the use of the digital signature. After that, quantitative methods were used to define and characterize value (quantitatively) or quantify certain scenarios regarding the perception of the use of the digital signature.

Determining the central tendency and the distribution of the frequency of the responses requires the calculation of the arithmetical mean, median and mode values. The frequency distribution of the responses can be highlighted with the help of a histogram and represents a grouping of these responses according to a certain criterion or class. The dispersion of the responses can be measured using standard deviation and variance [55]. The determination of the confidence interval for certain statistical variables, delimited by the lower and the upper limits, is calculated according to the representativeness error. The frequency distribution of responses also applies to multi-valued variables (resulting in chained tables). The Chi-square method is a statistical test used to check whether the difference between the data/variables under test is due to chance or whether there is a link/association/connection/relationship between them that may impose a predictable behavior/variation. Based on this test, certain hypotheses (developed in advance) can be verified. Some initial conditions are initially assumed to be satisfied and then verified [56].

The qualitative research used allowed the outlining of some aspects of the identified problem. By analyzing these aspects, as well as the attitudes and reasons that determined them, some qualitative information was delimited, which led to the clarification of the nature of the problems, solutions and/or alternatives. The SWOT analysis on the implications of the use of the digital signature is an example of qualitative research (as it does not involve quantitative values) [57].

### 3.3. A Summary of the Reviewed Literature in Support of the Used Methodology

Starting from the perception in the reviewed literature regarding the use of digital signatures by SMEs for sustainable development, we synthesized a summary of what each of the following concepts means: (1) the use of digital signatures by SMEs in general and by Romanian SMEs in particular, (2) the relationship between digitalization and sustainability which, together with the context, with the study methods approached and with the results obtained, we have summarized in the following Table 1:

**Table 1.** Literature review and methodological details.

Bibliographic Reference	Context	Identified Method	Details on the Relationship between SMEs–Digitalization–Digital Signature(s)–Sustainability
[3]	SMEs	Quantitative research	The planning and adoption by SMEs of a digitalization trend positively influences their sustainable development.
[8]	Generic organization	Literature review	If, at the end of the 90s, there were two main areas in the economy, a conventional sector and a digital one (which had just appeared), the COVID-19 pandemic facilitated the strong development of digital services (for example, e-commerce), and the creation of new digital services (for example, video conferencing and telework). The demand for digital services keeps growing today. For a rapid transition of the workforce to the new, highly digitized technological environment, the workforce must develop digital skills. Education and training policies, but also labor market policies, can support this swift transition to digitalization.
[13]	Generic organization	Literature review	Digital technologies used during the pandemic (online services, information-sharing platforms, etc.) have helped people stay connected and work together, and organizations to continue their businesses in a sustainable manner.
[15]	SMEs	Quantitative research	SMEs, to remain competitive and to have sustainable growth, must adapt to and adopt new technologies. Strategies and plans for sustainable development are needed, where digital technologies can be used to their full potential.

**Table 1.** *Cont.*

Bibliographic Reference	Context	Identified Method	Details on the Relationship between SMEs–Digitalization–Digital Signature(s)–Sustainability
[16]	SMEs	Quantitative research	Among the policies mentioned by Romanian SME managers, in order to reduce the consumption of energy and resources for sustainable development, we identified: (1) reducing the amount of paper used, (2) reducing energy consumption, (3) transitioning to digitalization. Digitalization facilitates the reduction of waste, thus contributing to the increase in environmental sustainability.
[18]	SMEs	Literature review	The gaps between Romanian SMEs and EU-27 SMEs regarding the perception, attitudes and behavior regarding digitalization and sustainability are identified in this paper. A set of guidelines are presented to accelerate the transition of Romanian SMEs towards digitalization, and also towards sustainable development.
[19]	SMEs	Literature review	Romanian SMEs continue to progress in the field of digitalization. They obtain financial benefits from digitalization through the development of e-commerce services. However, there is a lack of IT specialists in the Romanian market and within the Romanian SMEs.
[20]	Generic organization	Literature review	The implementation of a digitalization plan and the use of digital technologies by enterprises can generate competitive advantages in the future. Digital transformation, at the macro-economic level, is currently a priority for Romania.
[23]	Generic organization	Literature review	The electronic signature is employed as a trust enforcer in the public sector, in corporations, non-profit organizations, and business in general. Concrete implementation guidelines and procedures and the application of best practices in this field are needed, especially since digital signature technology can be used in all economic sectors.
[24]	SMEs	Quantitative research	The adoption of digital technologies by SMEs is influenced by the technological and organizational context and less by the environment in which they operate.
[25]	SMEs	Quantitative research	The digital transformation of enterprises needs to be supported differently through specific policies and considering the particular details (e.g., the size of the enterprise, the human and educational/training resources).
[26]	SMEs	Literature review	The main obstacles to the digital transformation of SMEs are time, costs and resources. The proposed solution to the removal of these obstacles is the development of integrated systems that allow these companies faster access to digital technologies.
[28]	SMEs	Literature review	Digital technologies improve economic efficiency and reduce costs. The electronic signature is a modern way to enable trust and to speed up business processes, to quickly make agreements, to establish business partnerships, to make payments, and to conclude transactions without barriers. However, there is also much distrust in electronic processes in business and therefore individuals still use hand-signed, paper-based documents. The electronic signature is a tool that confirms the legal value of business operations carried out in the online environment. For SMEs, the electronic signature is a modern way to speed up business processes, and to transfer them to the online environment. The following were identified as difficulties in the implementation of the digital signature: the need for the existence of a physical infrastructure, the existence of appropriate software and hardware tokens, strict requirements regarding data security, skills and knowledge that users must have, appropriate attitudes and behaviors.

**Table 1.** Cont.

Bibliographic Reference	Context	Identified Method	Details on the Relationship between SMEs–Digitalization–Digital Signature(s)–Sustainability
[32]	Generic organization	Literature review	The future belongs to those who prepare for it. The future also means digitalization of businesses. In this journey we need to stay connected and informed, which gives us the strength to succeed. Digitalization is a new stake in the future, which will help create a healthy economic and social environment, and will help society and businesses to develop sustainably. Virtual reality created through digitalization will generate sustainable growth and social inclusion.
[33]	Generic organization	Literature review	To create sustainable communities there must be policies and strategies, that is, a continuous public involvement.
[36]	Generic organization	Quantitative research	SMEs are important both for Europe's and for the world economy. If large enterprises have the financial and human resources to implement a digitalization transition, SMEs are still in the early stages of adopting digital technologies.
[38]	SMEs	Quantitative research	A study is carried out on the level of digital maturity of the EU-27 countries. An EU priority is digitalization, as fast as possible, in all areas of business and citizens' lives. Romania is mentioned among the countries with poor results regarding the digitalization of SMEs. Romanian SMEs that use digital technologies are fewer, compared to the EU-27 average. For example, electronic invoicing is used by only 17% of SMEs, compared to the EU-27 average of 35%. Investments in research and development are needed for SMEs to increase their level of digitalization.
[41]	SMEs	Quantitative research	Romanian SMEs use software tools for business operations (management programs, accounting programs, etc.), electronic signatures, security, sales, communication, etc. The second most commonly used software by Romanian SMEs is that for digital signature. Romanian SMEs in the field of tourism use the electronic signature most often within their activity.
[42]	Generic organization	Quantitative research	The digital signature has been widely accepted and used during the COVID-19 pandemic. Digital signature providers must take into account the interest and experience of consumers in its use. It has been found that there is a correlation between consumer attitude, behavior, legislation, information obtained and the use of the digital signature.
[58]	SMEs	Literature review	The negative effects of the pandemic on companies, the vast majority of them being SMEs, have made us rethink the way we do business. The digitalization of SMEs is crucial, especially since these enterprises represent the economic development engine of each country. The level of digitalization of SMEs in the EU countries is increasing. Around 10% of SMEs use advanced digital technologies. As identified, the barriers facing faster digitalization are the lack of knowledge and skills in the digital field or the lack of financial resources to own and use digital technologies. Digitalization contributes to increasing the performance of SMEs.

#### 4. Results

Based on the data obtained following the application of the two questionnaires and using the research methodology based on the discussed methods, the research was carried out. The results of the research are presented in this chapter.

#### 4.1. Preliminary Analysis

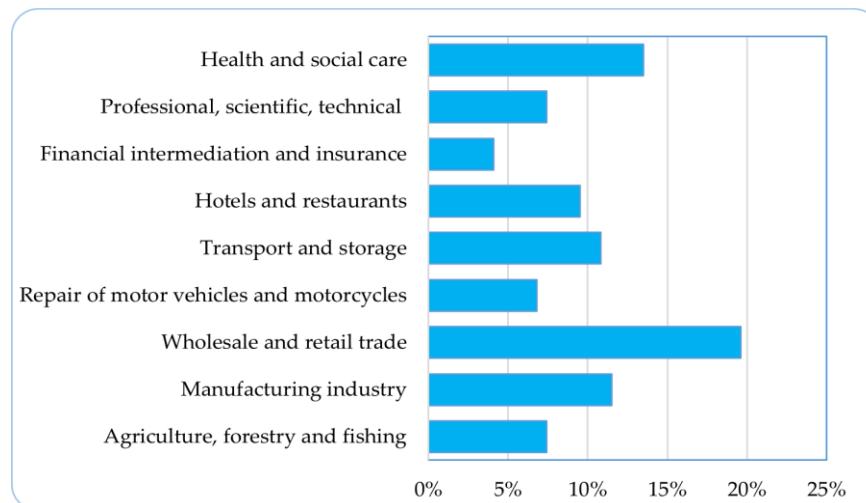
We used bar charts as a method to describe the frequency of responses given to questionnaire questions. The questions in the questionnaire regarding digital signature use cases aim to achieve the following research objectives:

1. Identification of the SME, according to field of activity and seniority: questions Q1, Q2, Q3.
2. Frequency of use of digital signature: question Q4.
3. Digital signature use cases: question Q5.
4. Improving business through the use of digital signature: question Q6.
5. SWOT analysis of the use of digital signature: questions Q7, Q8, Q9, Q10.
6. The framing of policies in the area of digitalization in the trends regarding the Digital Single Market for Europe and in the trends seen in the National Recovery and Resilience Plan (PNRR): Q11, Q12.

The questions of the second questionnaire, intended for digital signature providers, aim to achieve the following objectives of the research:

1. Identification of SMEs and share in total customers: question Q1, Q2.
2. Categories of digital certificates requested and their validity: question Q3, Q4.
3. Renewal of digital certificates: question Q5.
4. New customers, SMEs in 2021: question Q6.
5. Trends in the use of digital certificates: question Q7, Q8.

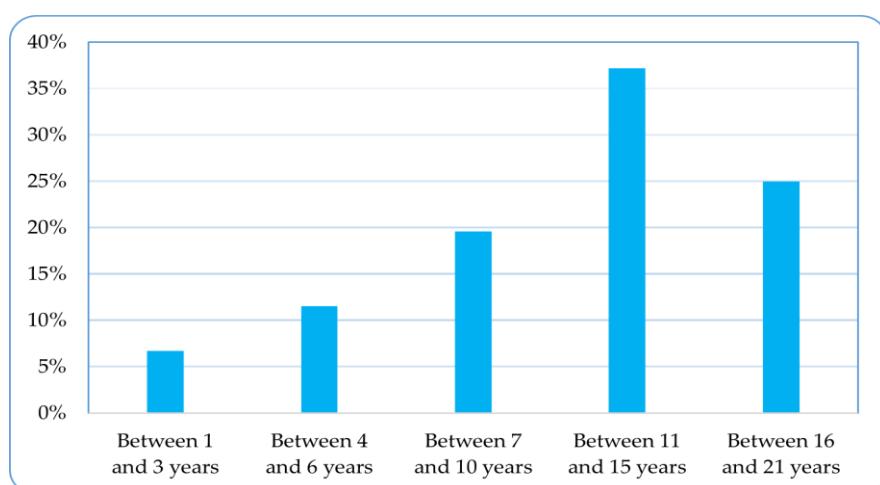
When asked (Q2) about their own field of activity, most of the enterprises carried out wholesale and retail trade activity—19.6%, other representative fields being those of health and social assistance—13.5%, transport and storage—10.8%, and HORECA (hotels, restaurants, and catering)—9.5% (see Figure 1).



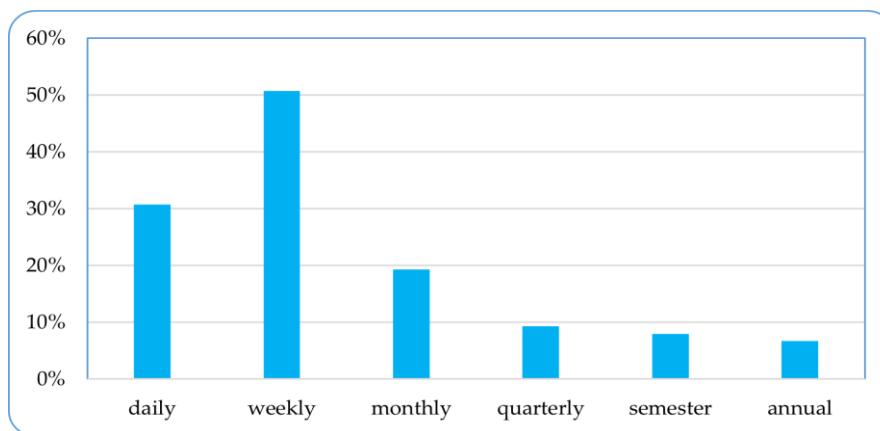
**Figure 1.** Fields of activity for the respondents.

Regarding the age of the company (Q3), most SMEs that completed the questionnaire have an age between 11 and 15 years (37.2%), followed by SMEs with an age between 16 and 21 years (25%). The least represented SMEs are those between 1 and 3 years old, which represent 6.7% of all surveyed SMEs (see Figure 2).

A relevant question (Q4) for our study regards how often the SMEs in the South-West Oltenia region use the digital signature in their day-by-day activities. Thus, 50.7% of SMEs use the electronic signature weekly, and 30.7% of SMEs use it daily. The electronic signature is used once a year by only 6.7% of SMEs—most probably for once-a-year accounting and reporting purposes (see Figure 3).



**Figure 2.** Respondents' distribution based on their work experience.



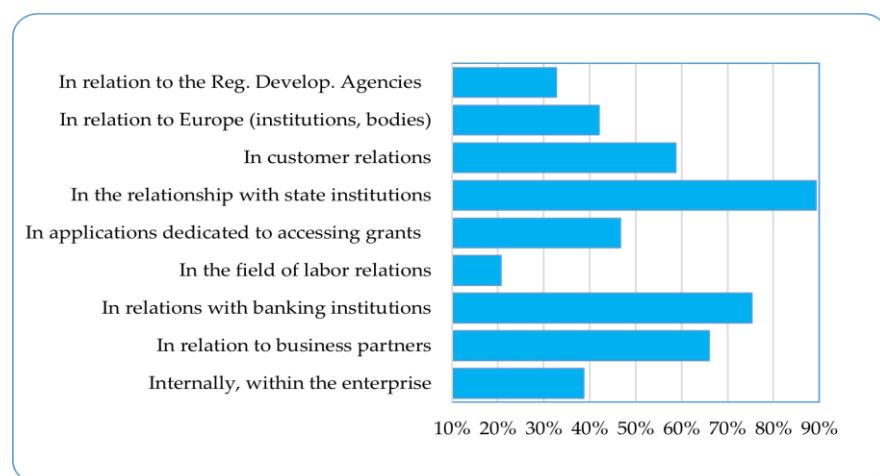
**Figure 3.** How often are digital signatures used by SMEs?

To question (Q5) “What are the cases in which your SME uses the digital signature?”, 89.3% of SMEs use the digital signature in their relationship with state institutions, such as the National Fiscal Administration Agency (ANAF—<https://www.anaf.ro/> accessed on 27 July 2023), National Insurance House of Health (CNAS—<https://cnas.ro/> accessed on 27 July 2023), Territorial Labor Inspectorate (ITM—<https://www.inspectiamuncii.ro/> accessed on 27 July 2023), National Trade Register Office (ONRC—<https://www.onrc.ro> accessed on 27 July 2023), etc.

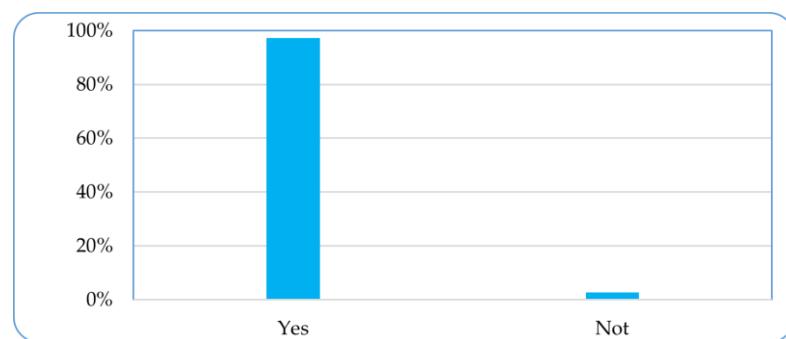
75.3% of SMEs use the electronic signature in their relationships with banking institutions, and 66% of SMEs use it in their relations with business partners, for online sending of documents and contracts.

Other cases in which SMEs use the electronic signature are internally, within the company, for the transmission of documents, by 38.7% of SMEs; when concluding individual employment contracts, additional documents, and other documents in the field of labor relations and occupational safety and health, 20.7% of SMEs use the digital signature and 58.75% of SMEs use the digital signature in their relations with customers. In their relationship with Europe (institutions, bodies), 42% of SMEs use the electronic signature, and in their relationship with the Romanian Regional Development Agencies, 32.7% of the SMEs use the electronic signature (see Figure 4).

For 97.3% of the Romanian SMEs (Q6) in the South-West Oltenia region, the use of the digital signature is beneficial and improves their activity (see Figure 5).

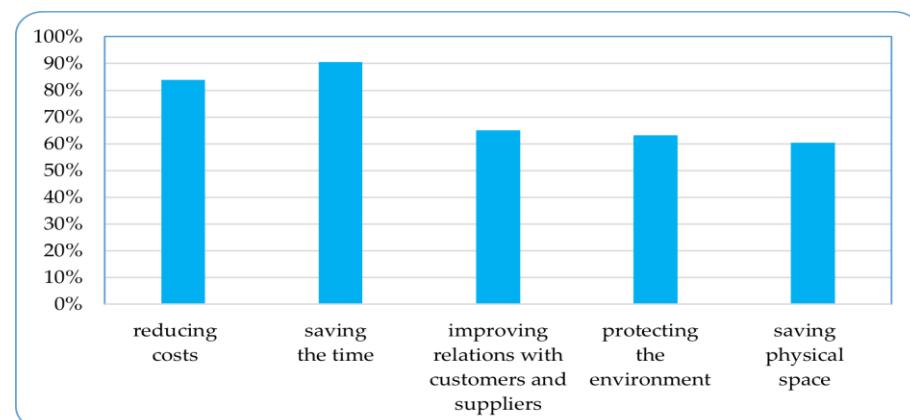


**Figure 4.** SMEs use cases for digital signatures.



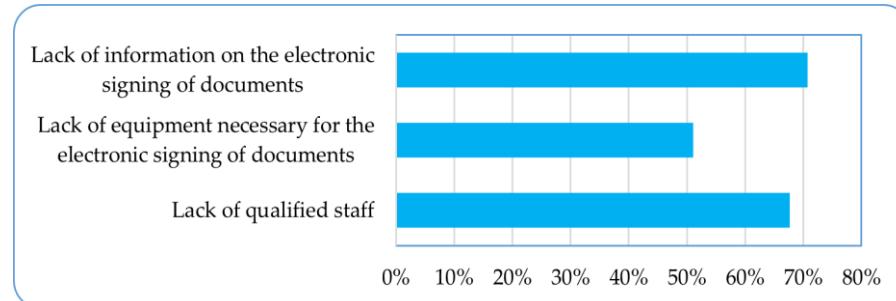
**Figure 5.** How much does the use of electronic signature improve SMEs' business activity?

In this first study, we also carried out a SWOT analysis (Q7, Q8, Q9, Q10) of the use of digital signatures by Romanian SMEs. Most of the SMEs (90.6% of SMEs) believe that the use of the electronic signature helps them save time allocated for signing, sending, archiving, and searching for documents, 83.9% of SMEs believe that the electronic signature helped them reduce the costs of printing documents on paper, physical signing, with and sending documents by post, and 65.1% improved their relations with customers, following the application of the digital signature. The proof of the fact that digitalization contributes to the sustainable development of SMEs is that 63.1% of SMEs found that by using the digital signature they saved paper for printing and fuel for transporting documents to recipients, so they contributed to protecting the environment. In addition, 60.4% of SMEs saved physical space in offices and archives by using digital signatures (see Figure 6).



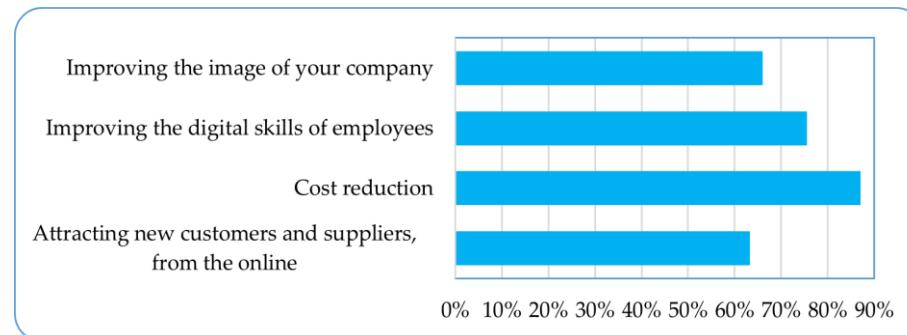
**Figure 6.** Identified strong points for digital signature use.

The disadvantages of the use of digital signatures by SMEs are represented, above all, by the lack of information regarding the actual process and consequences of electronic signing of documents (reported by 70.7% of SMEs). The lack of qualified personnel (reported by 67.7% of SMEs), and the lack of equipment necessary for the electronic signing of documents (computers, internet connection, electronic archiving devices), felt by 51.1% of SMEs, are other weaknesses of using digital signatures (see Figure 7).



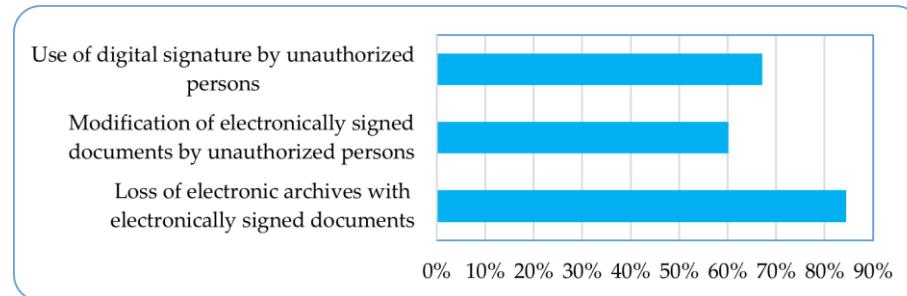
**Figure 7.** Disadvantages of using electronic signatures.

The biggest opportunity for SMEs provided by using digital signatures is that of cost reduction, highlighted by 87.1% of enterprises. Another opportunity is to improve employees' digital skills (reported by 75.5% of SMEs). For 63.3% of SMEs, attracting new customers and suppliers from the online environment is considered an opportunity (see Figure 8).



**Figure 8.** Opportunities offered by electronic signing.

The biggest threat that the vast majority (84.4%) of Romanian SMEs feel when using digital signatures is the loss of electronic archives with electronically signed documents. Another threat felt by 67.2% of SMEs is the use of e-filing by unauthorized persons (see Figure 9).



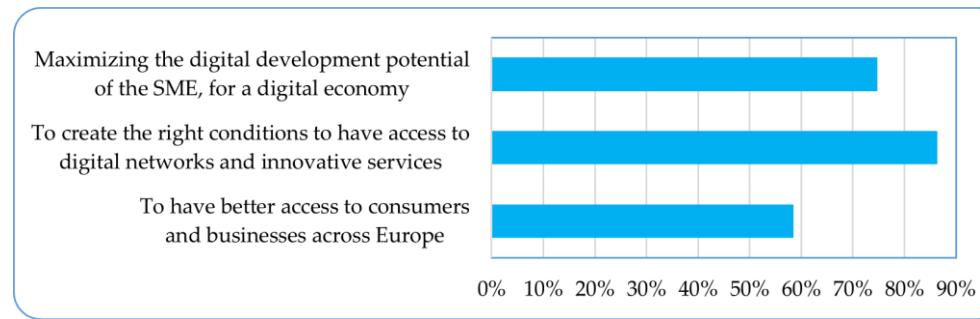
**Figure 9.** Threats identified by SMEs when using digital signatures.

From the SWOT analysis regarding the use of digital signatures by Romanian SMEs, the following aspects emerge:

- The representatives of the companies that provided answers believe that the use of the digital signature offers at least one strong point (reducing costs, saving time, improving relations with customers and suppliers, protecting the environment, saving physical space), as follows:
  - The majority (over 60%) appreciate all the strengths presented in the questionnaire.
  - Over 16% appreciated only one strong point (and of these, half appreciated only saving time, and one fifth appreciated only cost reductions).
- Weaknesses are identified as at least one of the following: lack of information, lack of necessary equipment and lack qualified staff, as follows:
  - Half gave a single answer (of which almost two thirds identified lack of information and almost 14% identified lack of qualified staff).
  - More than one third identified as weak points both lack of necessary equipment and lack of qualified staff, which shows that investment must be made in both equipment and staff qualifications.
- The identified opportunities are valued as at least one of the elements: improving the image of the company, improving the digital skills of employees, cost reduction and attracting new customers and suppliers from online, as follows:
  - Over 21% gave a single answer (of which two thirds chose improving the digital skills of employees).
  - Almost 60% appreciate, among other opportunities, improving the image of the company and attracting new customers and suppliers from online (that is, those opportunities that “help” increase trust in the company among customers and suppliers).
- The threats to SMEs regarding the use of digital signature refer to one of: use of digital signature by unauthorized persons, modification of electronically signed documents by unauthorized persons and loss of electronic archives with electronically signed document, as follows:
  - At least 60% of respondents chose at least one of the threats.
  - Over 40% chose only one threat, and of these two thirds considered loss of electronic archives with electronically signed documents to be a threat.

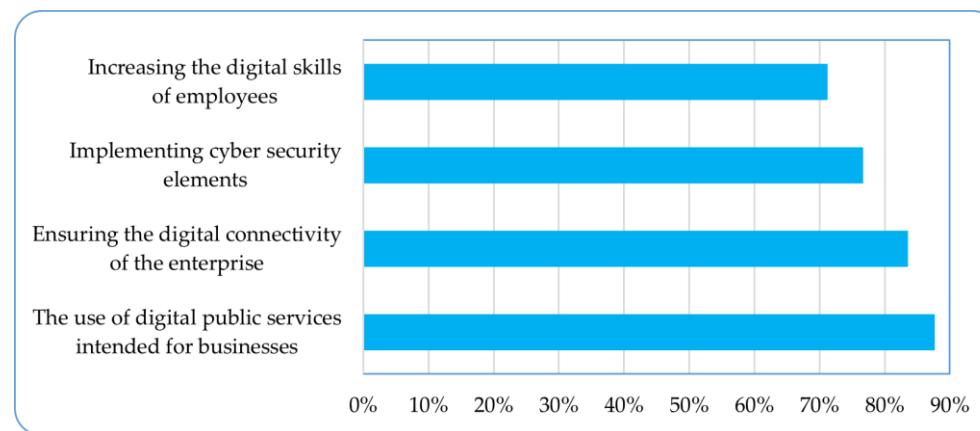
Through the SWOT analysis, it is presented that the respondents appreciate the advantages (strengths and opportunities) of using the digital signature, but the weaknesses as well as the threats that appear are also highlighted. As was highlighted, the lack of information was materialized in fact by the lack of information to users, which should be improved both by the authorities and by specialized staff, regarding the advantages of using the electronic signature and the lack of threats and dangers. Moreover, the use of the digital signature ensures the integrity/authenticity/originality of data/documents, especially for complicated encryption algorithms [59].

The establishment of the Digital Single Market of the European Union made us want to find out if the policies of Romanian SMEs in the field of digitalization fit into the trends regarding the European Single Digital Market (Q11). The results of the study highlighted that SME policies include better access to consumers and businesses across Europe (for 58.5% of SMEs), creating the right conditions to access digital networks and innovative services (a policy targeted by 86.4% of SMEs), but also maximizing the digital development potential of the enterprise for a digital economy (74.8% of SMEs). All these components represent the pillars on which the Single Digital Market of the European Union is built [60] (see Figure 10).



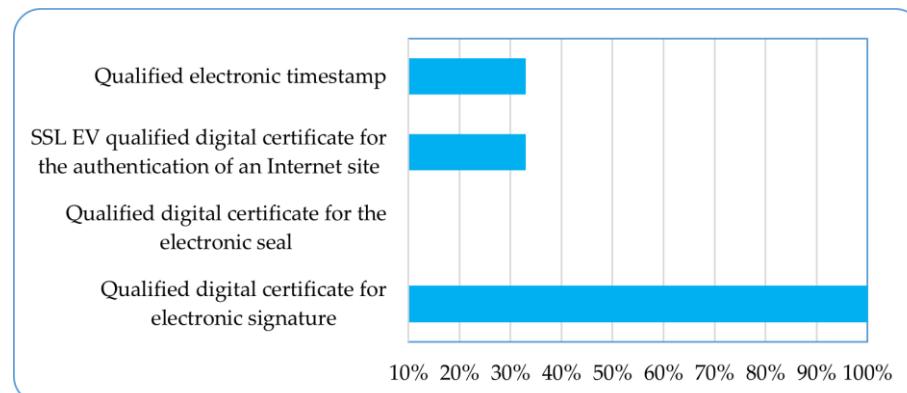
**Figure 10.** EU Digital Market trends and Romanian SMEs' policies towards digitalization.

The study elaborated on Romanian SMEs from the South-West Oltenia region also aimed to correlate the policy of SMEs in the field of digitalization with the trends generated by the implementation of the National Recovery and Resilience Plan (PNRR) [61]. The trends in the field of digitalization, generated by the implementation of the PNRR (Q12), were included in the digitalization policies of SMEs as follows: the use of digital public services intended for businesses (included by 87.7% of SMEs), the increase in the digital skills of employees (included by 71.2% of SMEs), and the implementation of cyber security elements, a priority for 76.7% of SMEs. For 83.6% of SMEs, their digitalization policy also includes ensuring the company's digital connectivity (see Figure 11).



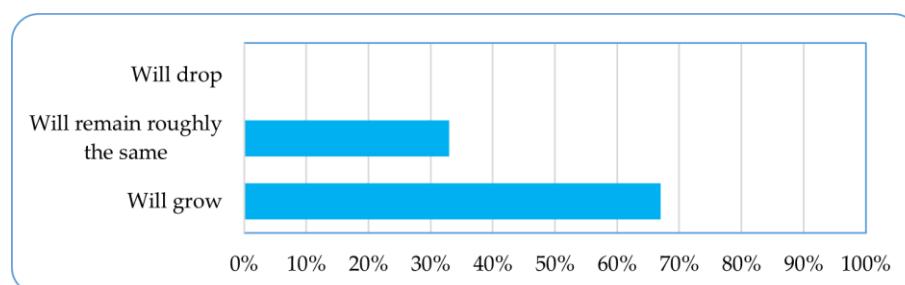
**Figure 11.** Digitalization trends generated by the National Resilience and Recovery Plan.

The second study targets those who provide the digital signature to Romanian SMEs. To the question (Q3) "What are the categories of digital certificates requested most often by SMEs?", the responses of the digital signature providers were that the most requested by SMEs are digital certificates qualified for electronic signature (see Figure 12).



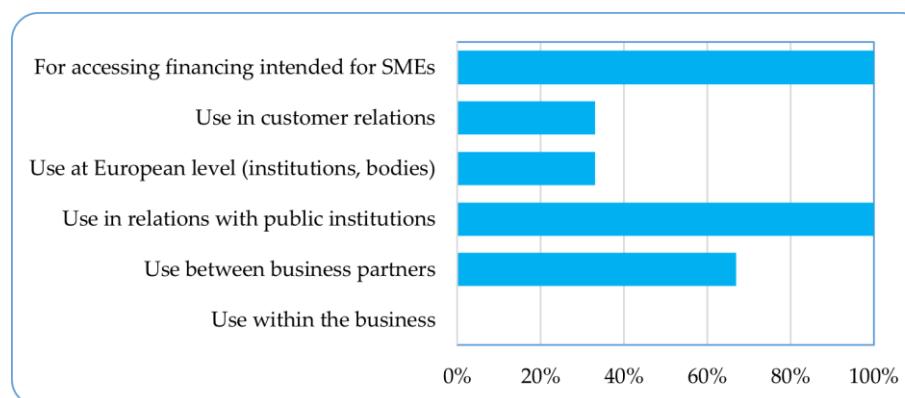
**Figure 12.** Most requested types of digital certificates by the SMEs.

Romanian SMEs use digital certificates valid for 1 year up to a maximum of 3 years. The most requested are digital certificates with a validity of 1 year, which are purchased by a percentage of between 51–75% of clients for two providers, and by a percentage between 75–100% of clients for a single provider, among Romanian SMEs. Two-year and three-year digital certificates are requested by up to 25% of SME customers for two providers, and by a percentage between 26–50% of customers for a single provider (Q4). To the question (Q5) "How many of the Romanian SMEs, which use digital certificates, renew their certificates?", the answers were that over 75% of the SMEs (the customers of two providers) and up to 30% of the SMEs (the customers of a single provider) renew their digital certificate subscriptions. The Romanian trust service providers were questioned (in Q6): "What is the percentage of SMEs from the total of new digital certificate subscribers, since 2021?" Two of them said that in 2021, of all SME customers, between 31% and 50% were new customers, and for one provider new customers were up to 30%. The number of Romanian SMEs that will request digital certificates will increase in the future (Q7), according to two digital signature providers in the Romanian market (see Figure 13).



**Figure 13.** Trends in the Romanian digital certificates market, from the trust service providers' perspective.

The cases in which Romanian SMEs most frequently use the purchased digital certificates are (Q8), from the perspective of digital certificate providers (those three who answered our questionnaire) in the Romanian market, both for use in relations with public institutions and for accessing financing intended for SMEs (see Figure 14).



**Figure 14.** Digital certificates use cases—a trust service provider perspective.

Another analysis we made was by means of the IBM SPSS Statistics version 26 software platform concerning the dispersion of the answers to this questionnaire. The number of values processed is  $N = 187$  for the six variants (see Figure 15), which does not correspond to the number of respondents, because some respondents stated that they use, for example, the digital signature daily, but also quarterly (or another variant), which implies the existence of two (or more) digital signature certificates within some companies. One can see the concentration of answers towards the three answer variants in descending order: Weekly, Daily, and Monthly.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	46	24.6	24.6	24.6
	Weekly	76	40.6	40.6	65.2
	Monthly	29	15.5	15.5	80.7
	Quarterly	14	7.5	7.5	88.2
	Semester	12	6.4	6.4	94.7
	Annual	10	5.3	5.3	100
	Total	187	100	100	

**Figure 15.** How often digital signatures are used.

For the SPSS analysis, the six scenarios have six associated values: Daily = 1, Weekly = 2, Monthly = 3, Quarterly = 4, Semester = 5, Annual = 6. The first 46 answers are considered to have the associated value 1, the next 76 answers have the associated value 2 and so on (so answer 94 has the associated value 2). The median is equal to the value associated with the answer 94 (the middle of the interval (1–187)), that is, to 2.

The sum of the values associated with the answers is: Sum =  $(46 \times 1 + 76 \times 2 + 29 \times 3 + 14 \times 4 + 12 \times 5 + 10 \times 6) = 461$ . Mean value is equal to: Sum/187 = 2.47.

Therefore, the median is lower than the mean and the responses will have an asymmetric distribution, concentrated to the left, towards the associated small values: Daily = 1, Weekly = 2, Monthly = 3. The standard deviation is calculated as the square root of the variance, and it shows how the responses are dispersed in relation to the mean. A large standard deviation shows that there are many responses spread out from the mean but does not show how far they are from the mean. However, the value of the standard deviation (1.388) is not very large, reflecting the fact that few responses are dispersed from the average value.

#### 4.2. Fundamental Research

A descriptive analysis was carried out for the nominal (qualitative) variables associated with the question “Seniority (Age/Work Experience) for the company?” and “How often do you use the digital signature?” by applying the Chi-square test using the CROSSTABS function in SPSS. The aim is to obtain some information about the sample that answered the questionnaire [62].

We start from the null hypothesis that the two variables are independent, and we verify this with the help of the Chi-square test. For the answers to the first question, the following numerical values are associated: 1 = “1 to 3 years”, …, 5 = “16 to 21 years”. For the second question, the following numerical values are associated: 1 = “daily”, …, 6 = “annually”. It is observed that there is not a uniform distribution of answers for all variants by applying the Chi-square test. The displayed message is: “11 cells (55.0%) have an expected count less than 5. The minimum expected count is 39”. To remove it, a regrouping of the answers to the two questions was done (for the first question, they were combined resulting in four groups, and for the second question in two groups), obtaining the correlation coefficients from Figure 16. The coefficient “p” appearing in the column “Asymp. Sig. (2-sided)” has the value 0.017, being lower than 0.05, which shows that the two variables can be associated and correlated, therefore not accepting the null hypothesis that the variables are independent [63,64]. The variables are in a linear relationship, and the value of this statistic is 5.002. The table on the right suggests the way of association of the two correlated variables: for both variables, the extreme categories are inversely associated with the median/central categories. Companies/organizations with a short history as well as those with a long history use digital signature less than those with an average age, perhaps due to the fact that newly established firms do not have yet an intensive activity, and the oldest ones are still reluctant to use digital signatures for all their documents. But

what are the cases where companies use digital signature and what would be the level of trust and perception regarding the use for each use case?

	Value	df	Asympt Sig. (2-sided)
Pearson Chi-Square	11,990 <sup>a</sup>	4	0.017
Likelihood Ratio	13.441	4	0.009
Linear-by-Linear Association	1.711	1	0.191
N of Valid Cases	143		

(a) 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.30

	Company seniority (in years)			Total
	1	2	3	
How often digital signatures are used?	1	10	21	43
	2	27	30	71
	3	15	4	29
Total	52	55	36	143

**Figure 16.** The coefficients obtained by applying the Chi-square test for two variables attached to the age of the company and the way of using the digital signature.

The answer to the previous question is obtained if one determines the confidence limits for these use cases, as shown in Table 2. It is observed that the degree of confidence and the perception of the use of the signature are different. The signing of internal documents is carried out by at least 32.77% of companies and by at most 48.83%. The biggest use is for relations with banks and state institutions.

**Table 2.** Determining the confidence limits.

What Are the Cases in Which an SME Uses the Digital Signature	Representativeness Error	Error Limit	Lower Limit	Superior Limit
Internally, within the company, for the transmission of documents with legal value	0.040955	0.080272	0.3277	0.4883
In relation with business partners, for online sending of documents, contracts, etc.	0.038541	0.075541	0.6145	0.7655
In relation with banking institutions	0.034002	0.066643	0.7224	0.8556
Upon conclusion of individual employment contracts, additional documents, and other documents in the field of labor relations and occupational safety and health	0.034407	0.067438	0.1506	0.2854
In applications dedicated to accessing grants for SMEs	0.041667	0.081667	0.4183	0.5817
In relation with the state institutions: the National Fiscal Administration Agency (ANAF), the National Health Insurance House (CNAS), the Territorial Labor Inspectorate (ITM), the National Trade Register Office (ONRC), etc.	0.021262	0.041674	0.8883	0.9717
In relation with customers	0.040842	0.08005	0.5190	0.6790
In relation with European Union (institutions, bodies, agencies, etc.)	0.041335	0.081016	0.3560	0.5180
In relation to the Regional Development Agencies (RDAs)	0.039214	0.07686	0.2541	0.4079

Figure 17 shows the distribution of digital signature use according to use cases and frequency (how often it is used).

		Internally	Business partners	Banking institut.	Individ. contracts etc.	Grants SMEs	State institut.	Cus-tomer	Europe (instit., bodies)	RDAs
How often digital signature is used	daily	25	32	33	12	25	39	29	25	15
	weekly	26	52	64	15	37	67	49	32	27
	monthly	4	10	12	1	7	19	6	4	4
	quarterly	2	3	2	2	1	6	1	1	1
	Total	57	97	111	30	70	131	85	62	47

Figure 17. How often the digital signature is used relative to use cases.

Figure 2 shows a concentration of responses for firms with an age between 7 and 21 years. This explains the fact that many newly established firms chose not to respond to the questionnaire (being newly established they do not have a completed organization, or they lack organizational maturity).

Of the 30% SMEs that use digital signatures daily, 50% of them are 11–15 years old, and almost 29% of them are between 16–21 years old. Of those between 1 and 3 years old, more than 70% of them use the digital signature daily, and the rest use the digital signature weekly or monthly (newly established companies use the digital signature more frequently, because they were established in the context of the pandemic when the use of the signature digital was a necessity). Another reason would be that most of them received non-reimbursable funds (many of which were of the start-up type), being obliged to use the digital signature for submitting documents. Choosing a longer seniority period, 4–6 years, less than a third of them use a digital signature daily, and around 50% use it weekly. It is observed that the frequency of use is high.

In fact, most of the companies that answered, a percentage of 37% (covering almost all fields of activity), are 11–15 years old, 35% of them use the signature daily, and 53.7% use it weekly. A market presence of 11 years provides a necessary maturity to integrate the mandatory competencies of one's own activities (or to manage one's own activities).

The 24% of companies that use the signature quarterly, semi-annually or annually (almost one fifth are companies with an age between 16 and 21 years that would have as justification for the low use the fact that they may have employees with low digital skills) have specified as disadvantages, in the following order: lack of qualified personnel, lack of information regarding electronic signing of documents and lack of equipment necessary for electronic signing of documents (computers, internet connection, electronic archiving devices).

In fact, from Figure 7 it can be seen that the lack of information about the digital signature ranks first among the disadvantages for all SMEs, followed by the lack of qualified personnel. In order to increase the frequency of use of the signature by SMEs, interventions are needed from the authorities regarding the information about the policies included in the PNRR (Recovery and Resilience Plan) in relation to the need for digitalization of companies. Moreover, from Figures 5 and 8, it can be seen that SME representatives want to use the digital signature to improve their activity and to reduce costs (in both situations over 87% of companies chose this answer) as well as to increase digital skills of employees (over 75%).

Both providers and users of digital signatures, but also the authorities, must be in a partnership through which trust is given but also received, relative to everything that regards the actions and activities that should be undertaken (related activities of information but also increasing the digital skills of employees), as well as the provision of the necessary technologies by all partners, for a safe use of the digital signature (regarding the possibility of losing electronic archives with signed documents, more than 84% of the respondents opted for this and 67.2% opted for the probability of the signature being used by someone else—Figure 9) and benefiting from the advantages and opportunities of using the digital signature, as shown in the answers in Figures 6 and 8. The impact and relevance of the use of digital signature on SMEs is related to:

- improving the activity
- expanding the company by using non-refundable funds
- expanding the market in the EU and in the world.

The preparation of a profile that refers to the perception regarding the use of digital signature in SMEs in Romania should include several aspects that are described below. Thus, SMEs, which responded to the questionnaire as digital signature users have correspondence in all fields of activity. The representativeness of the companies that use the digital signature is given by those that are between 7 and 21 years old (however, this indicator has a complex correlation with the evolution of the establishment of the companies and with the availability of the company to provide an answer to the questionnaire). SMEs have a weekly average use of the digital signature, which they use, most often, in relations with state institutions and the banking system, while for internal documents or those related to employment contracts, security and health in work, the digital signature is not really used. At the same time, more than 97% of SMEs believe that the use of digital signatures improves their activity and that it offers them advantages and opportunities. SME policies follow market trends and unique digital solutions for Europe (concerning the creation of the right conditions to have access to digital networks and innovative services and maximizing the potential of digital development of the enterprise, for a digital economy), as well as the trends generated by the implementation of the National Recovery and Resilience Plan (relating to: the use of digital public services, ensuring digital connectivity, implementing cyber security elements and increasing the digital skills of employees).

## 5. Discussion

### 5.1. Digitalization of SMEs by Means of a Digital Tool: The Electronic Signature

A priority of the European Union is the rapid digitalization of businesses and the lives of its citizens. Since SMEs have a significant weight in the economy of every country (regardless of whether they are developed or developing countries), their digitalization is very important. This process is seriously addressed through the large number of documents developed by the European Commission. It is desired to achieve a sustainable digital development of all the member states of the European Union, which cannot be implemented without effort. The problem of digitalization, and the widespread use of digital tools, is related to the lack of information, the economic differentiation of countries, SMEs, and companies. This study addresses the issue of widespread use of digital tools by Romanian SMEs. The purpose of the study is to determine the impact and relevance of the use of digital tools, more precisely the digital signature, on Romanian SMEs and to answer the questions formulated at the beginning of the study. A relevant question for our study is that regarding how often the SMEs in the South-West Oltenia region use the digital signature in their day-by-day activities. Thus, 50.7% of SMEs use the electronic signature weekly, and 30.7% of SMEs use it daily. The electronic signature is used once a year by only 6.7% of SMEs (see Figure 3).

It is noted that the digital signature is not frequently used for all documents and so the following question can be formulated: Why is the digital signature not widely, frequently used? We have the answer in Figure 7, where the lack of information regarding

the digital signature (advantages offered, how to use, etc.) is emphasized by more than 70% of the respondents.

Regarding the answer to the question: what are the use cases for the digital signature?, according to Figure 4, it results that it is used mainly in relations with state institutions (which digitalized many of their services during the COVID-19 pandemic) and with banking institutions (which are digitalizing more and more processes, making more and more digital applications available to customers). The digital signature is little used (less than 50% of respondents use it) in internal activity, in the field of labor relations, and even for accessing grants.

A SWOT analysis, i.e., of strengths, weaknesses, opportunities, and threats, regarding the use of the digital signature, highlights interesting aspects. Concerning the answer to the question “What are the strengths, weaknesses, opportunities and threats regarding the use of the digital signature by SMEs?” a SWOT analysis was implemented regarding the use of the digital signature, highlighting some interesting aspects. Thus, the strengths of using the digital signature are, in order of importance (Figure 6): saving time, reducing costs, but also improving relations with customers and suppliers. The weak points in the use of digital signature are (Figure 7): lack of information, but also lack of equipment (reported by approximately 50% of respondents), which underlines the lack of financial resources, especially for SMEs in economically less developed countries. The opportunities brought to SMEs by the use of digital signature are (Figure 8), in order of importance: the possibility to reduce costs, to improve the digital skills of employees, but also to improve the image of the company. Attracting new customers and suppliers from the online environment is seen as an opportunity only by a little over 60% of the respondents, although now it is more and more appropriate for companies to be visible, to be able to carry out activities in the online environment. The threats regarding the use of digital signatures (Figure 9) are, most often mentioned, the loss of archives with digitally signed documents, while only 60% of respondents see as a threat the possibility of modifying electronically signed documents by unauthorized persons.

The creation of a digital single market in Europe has inspired us to include in the study elements that provide the answer to the question: is the policy adopted by SMEs in the field of digitization in line with the trends regarding the digital single market for Europe, as well as with those regarding the implementation of Romania’s National Recovery and Resilience Plan (PNRR)? (Figure 10) shows how the policy of Romanian SMEs, in the field of digitization, adapts to these European trends. Most SMEs will create the conditions to have access to digital networks and innovative services. However, only half of SMEs include internationalization in their policy, i.e., the possibility of having better access to European customers and businesses.

The implementation of Romania’s National Recovery and Resilience Plan (PNRR) will also create directions for action in the field of digitalization, by allocating important financial resources for the development of this field. Thus, according to Figure 11, most of the SMEs participating in the study included the use of digital public services in their policies. Also, most of the respondents will improve the digital skills of employees, which is proof that the widespread use of digital tools and the digitalization of Romanian SMEs is difficult to achieve without human resources that do not possess digital skills.

The presented discussion refers to part of the results that were obtained by applying the questionnaires. The issue of digitalization and the use of digital instruments such as digital signatures is important and topical for the entire economy of the European Union. SMEs must be involved in this digitalization process, otherwise a large-scale digitalization of the EU will be difficult.

## 5.2. Trust Service Providers’ Perspective on SME Digitalization

We also considered relevant for our study the answer to the question: what is the perspective of trusted service providers on the digitalization of SMEs? Thus, they consider that:

- The most requested digital certificates (see Figure 12) by SMEs are those for the digital signature, valid for one year (users choose the shortest validity period probably for the following reasons: distrust regarding the possibility of changing the conditions, reducing costs, etc.)
- Only approximately a quarter of SME customers request digital certificates valid for two or three years.
- Renewal of certificates is requested by about three quarters of the users (probably the remaining 25% suspend their activity or turn to other providers).
- In 2021, almost half were new SME customers. This fact was also due to the COVID-19 pandemic, the digitization of services offered by public institutions, digital services offered by banks, access to non-refundable financing [65], and using digital tools such as digital signatures (submission of documentation had to be digitally signed).

In order to see the interest in buying digital certificates, but also where the Romanian SMEs will use the digital signature the most, we also included in the study questions regarding the trend towards the purchase of digital certificates, which will increase more and more in the future (Figure 13). Where will they use digital certificates most often? Digital service providers believe (Figure 14) that they are employed for accessing funding and in relations with public institutions. Areas such as those specific and internal to the business, on the other hand, are ignored.

The main barrier to the digitalization of Romanian SMEs is the lack of financial resources [58]. In fact, this can also be seen from the study, which shows that SMEs lack the necessary equipment and qualified personnel.

### 5.3. Sustainability of SMEs through Digitalization

Another approach of the study aims to provide an answer to the question: how can the use of the digital signature ensure the sustainable development of Romanian SMEs? Sustainable development is also achieved following the digitalization of Romanian SMEs. Although most respondents believe that digitalization brings with it cost reductions, only less than half of the interviewed SMEs see digitalization as a way to protect the environment (Figure 6).

The use of the digital signature contributes to the sustainable development of Romanian SMEs because it ensures the protection of the environment by saving paper for printing and fuel for transporting documents to recipients. This reduces waste and increases the production of ecological services. Digital solutions generate faster processes that use less resources.

But how can SMEs be motivated to widely use digital signatures? The conclusion that emerges is that, in order to be or to become competitive in today's increasingly digitalized world, SMEs must use as many digital tools and technologies as possible. A digital tool that is quite often used, but which is not yet widely used by Romanian SMEs, is the digital signature, about which not all SMEs are informed, and the advantages or weaknesses are not known, nor are what opportunities its use offers. Digitalization is at the beginning of the road in Romania, and Romanian SMEs do not have enough information to use digital tools in their activity. The most relevant actor for increasing digitalization is the state, which can encourage and enforce the use of digital signatures (for accounting files or various reports, funding projects/programs, funding requests, etc.). The purpose of this study is to determine the impact and relevance of the use of digital tools, more precisely the digital signature, on Romanian SMEs. Once the information is obtained, with the financial resources offered by the EU and through the PNRR, SMEs will be able to purchase digital tools, digitalize processes, which will help them become competitive, develop sustainably, and count in the global economy, which is becoming more and more digitalized. Romanian SMEs need information and resources to digitalize.

## 6. Conclusions

Digitalization is a problem for SMEs in less developed economies, which do not have sufficient information, financial and human resources to implement digital tools on a large scale. The results of this study can be successfully used to study other regions of Romania, as well as other countries where the digitalization process of SMEs is just beginning.

For the EU, the digitalization of society, and of organizations, is a priority because developed countries, where digitalization is implemented on a large scale, have demonstrated that sustainable, competitive, innovative economies are digitalized economies. SMEs are a key component in this global process.

It is, therefore, important to know regionally the level of digitalization of Romanian SMEs, what kind of digital tools they use, and what are the barriers to digitalization, so that, then, solutions can be found to accelerate the digitalization process.

The results of the research are as follows:

1. Romanian SMEs are aware of the EU's tendency to build a single digital market as well as the importance of accessing this market; however, only half of the SMEs consider creating the conditions (elaboration and implementation of policies in this sense) to penetrate this market.
2. The barriers to digitalization, reported by half of SMEs, are lack of information on digital tools, lack of equipment (therefore lack of financial resources), and lack of qualified human resources. A SWOT analysis on the use of digital tools (of which we chose for our study the digital signature) reveals that SMEs are mostly, however, aware of the importance and the advantages of using the digital signature.
3. Romanian SMEs are motivated to digitalize, to use digital tools, from the point of view of digital signature providers in the Romanian market, especially since 2021 brought 50% more new SME customers. The motivation to go digital comes, on the one hand, from the existing trend at the EU level but also from the cases where they have to use digital tools (for example, digital signature): for access to financing offered by the state (for example, PNRR) and in the relationship with public institutions.
4. The sustainable development of Romanian SMEs is achieved through digitalization, but it is a way of thinking and action of only 60% of SMEs, who see digitalization as a way to protect the environment, to reduce costs, and to reduce consumption of resources.

The results of the study are challenges faced by all EU SMEs, to a lesser or greater extent, depending on the level of economic development of the area, of the country to which they belong. These findings can be taken into account when developing a regional digitalization strategy to help SMEs with information and resources to digitalize. Regional university study programs can also be implemented to train specialists (future human resources) in digital technologies, and in the creation and use of digital tools for SMEs. The rapid digitalization of Romanian SMEs will help them recover after the pandemic crisis. The COVID-19 pandemic has transformed the economy and businesses, and these transformations can be topics for future research in this field. As a synthesis, we can consider that research results can be used to develop strategies; to improve the information process regarding: digitalization, digital tools, the digital signature, processes that can be digitalized, and cases in which digital tools can be used; to improve access to financing for digitalization, for the EU economy, but especially for SMEs.

The limitations of the conducted study are due to the fact that the SMEs participating in the study are at the regional level. More than half of them are more than 10 years old, with SMEs up to 3 years old being poorly represented (below 6%). Only 60% of digital service providers in the Romanian market participated in the study.

The research carried out and the results obtained led the authors to new research directions for the future. Thus, a study will be carried out on the use of other digital tools by SMEs, at a regional level and extended at a national and international level. This future study could influence the research and development directions of digital solution providers, in the national and international market.

Regarding future work, we think it would be interesting to carry out research at national and international level to identify the barriers that arise in the way of using digital technologies and what should be the approaches of international bodies and national public institutions to encourage SMEs' digitalization, which represent through their number, the engine of the economy of any European state.

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