

# Evaluation of the Business Model of Introducing High Technology into the Solidarity Economy

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*Abstract:* - The aim of the study was to determine the positional content of the use of high technology in the system of solidarity of community members in the implementation of business processes to ensure efficiency in the socio-environmental and economic development triad. Blockchain technology (N=3,073 projects) was selected as an example of high technology, which is used to stimulate the decentralization of the economy and strengthen social influence in the solidarity economy. The use of complex research methods to achieve this goal — situational analysis, systems analysis, reproductive analysis, structural-functional analysis — was proposed as the generalizing evaluation block. The research results confirmed the main hypothesis: the higher the level of socio-economic development of the solidarity economy model in terms of digitalization ( $r=0.866$ ), informatization ( $r=0.754$ ) and professionalization ( $r=0.564$ ), the more efficient socially-oriented business models that involve high technologies are in a particular territory. The study also shows that the blockchain can provide additional (65% of projects) as well as transformational solutions (25% of projects) for alternative energy projects.

*Key-Words:* - Advanced technologies, bitcoin, digitalization, informatization, professionalization, social efficiency, solidarity economy.

Received: August 25, 2021. Revised: September 11, 2022. Accepted: October 13, 2022. Published: November 3, 2022.

## 1 Introduction

The global economic and political instability of recent decades has exposed the shortcomings of the current welfare system and has once again evidenced the need for an alternative or complementary development paradigm. A solidarity economy is a viable solution in this situation for restoring the balance of economic, social and environmental goals [1].

Rapid and profound changes in the economic worldview caused by the migration, technological change and other challenges lay the foundation for generative ecosystems based on social and digital transformation, consolidation and introduction of high digital technologies into a solidarity economy [2, 3]. These are primarily the issues of maintaining social responsibility and cohesion, as well as accelerating social and environmental transition [4].

There is currently a lack of research on the use of innovative technologies in business processes in a solidarity economy, its capabilities and barriers for the adaptation to the consolidated concept of the economy of interactions. The aim of this study was to determine the effectiveness of the introduction of high technology in the implementation of business projects of socio-environmental and economic development based on the principles of solidarity with community members. This aim involved the following objectives:

- determine the main priorities and strategic directions of the use of high technologies in the implementation of business development models in the solidarity economy;
- evaluate the socio-environmental and economic results of the implementation of innovative solutions in community development based on the solidarity economy principles.

## 2 Literature Review

In a solidarity economy, ordinary people play an active role in shaping all dimensions of human life: economic, social, cultural, political and environmental. Manifestations of solidarity exist in all sectors of the economy of production, finance, distribution, exchange, consumption and governance [5]. They are aimed at transforming the social and economic system, which includes public, private and third —civil — sectors [6, 7].

Below, we will use the author's vision of the definition of solidarity economy — a complex concept that describes the social component of joint responsibility for the results of activities in a particular economic sector to meet the needs of all participants in the process. Such forms of

organization include cooperatives, mutual benefit societies, associations, foundations, non-profit and social enterprises that produce goods, provide services or disseminate knowledge, pursuing economic and social goals and promoting solidarity of participants involved in economic processes [8].

In view of the social vector of solidarity economy development, many researchers [9] call it a method for conceptualization of global transformational monetary qualities, practices and fundamentals. These include digitalization and other advanced technologies that are increasingly changing the economy. A blockchain that is compatible with the economy solidarity principles in terms of its internal content can be a key tool that strengthens the vector of the economy's social component [10]. Blockchain technology, which is based on building a blockchain, allows digital decentralized sharing datasets and managing the value of assets or goods without the need to depend on a trustee that centralizes the process. Therefore, this technology is able to revolutionize the future development of the economy and society, transform both industry and services, as well as social relations. For example, a recent study by the World Economic Forum [11-13] evidences that blockchain technology can store more than 10% of the world's gross domestic product (GDP) by 2027. Besides, the blockchain has an internal approach to decentralization. It can generate high social added value through tracking of product transfer links, fair pricing. It can become a universally recognized and tested standard, as well as democratize access to services and products in all areas of distribution solidarity [10, 14].

Both the platform user evaluation model and the decentralized blockchain network are well aligned with the social economy principles, and especially cooperatives [15]. This idea is based on the observation that both technologies (cooperatives in the production and sale of products, and blockchain in the calculation and control of payments) can affect the powerful position of intermediaries on the Internet. Just as agricultural cooperatives help farmers gain power in the market by outpacing intermediaries, digital technologies, together with social economy enterprises, can help users gain control over their activities, increase their incomes or reduce prices, and benefit from the use of social technologies [16].

## 3 Research Methodology

The general research methodology is based on a comprehensive evaluation of the effectiveness of the introduction of high technology (digitalization, informatization, professionalization) into the

solidarity economy. Figure 1 shows the block diagram of the study developed for this purpose, indicating the evaluation criteria. It was proposed to

evaluate the level of digitalization of the solidarity economy development using the indicators listed in Table 1.

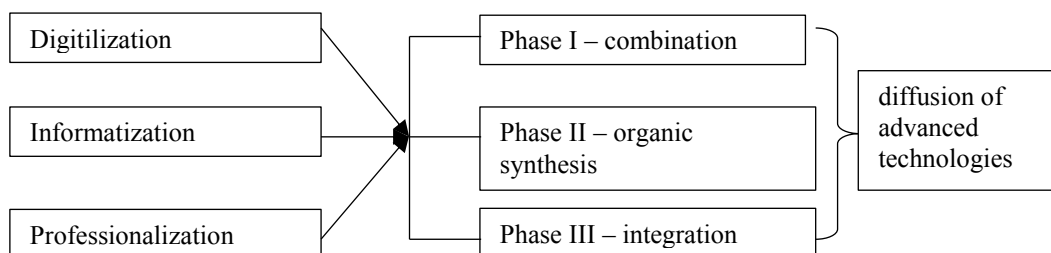


Fig. 1. System integration phases of evaluating business model of advanced technology introduction into the solidarity economy

Table 1. Indicators for assessing the level of digitalization of the solidarity economy

Indicator	Value	Index used for the calculation
Development of e-government technologies	Improving the quality of information services provided by the state; decrease of administrative barriers; reduction of administrative costs; improving the efficiency of public authorities, as well as the quality of public and business services	E-government Index, calculated by the UN for each country or region <a href="https://publicadministration.un.org/egovkb/en-us/data-center">https://publicadministration.un.org/egovkb/en-us/data-center</a>
Access to information and electronic communication	The index measures the information and communication capability of citizens of a country to have universal, objective and equal access to information for all	Information Society Index (ISI), combines 16 variables located in four sectors to be calculated and ranked within one common index. The index sets the standard by which all countries are measured according to their capabilities, access and use of information and information technology (Figure 3). The index is posted on the site <a href="http://www.idc.com/groups/isi/main.html">http://www.idc.com/groups/isi/main.html</a>

Figure 2 illustrates the structure of the Information Society Index (ISI), which is an electronic index based on the international level of indicators in the field of information and communication technologies. The formula 1 for calculating ISI is the following:

$$ISI = f(SP; SU; SI; SIn), \text{ where} \quad (1)$$

SP – solidarity economy potential sector; SU – sector of use; SI – infrastructure sector; SIn – solidarity economy innovation sector;

The informatization (information potential) level of the solidarity economy is the most important component of its technical, technological and managerial background. It is a combination of organizational, technical and informational capabilities needed to ensure the preparation and adoption of management decisions [17].

A group of methods aimed at the system of economic organization as a whole was chosen to

evaluate the impact of informatization on the community development in the solidarity economy:

- network methods — building a complete graphical model of a set of works to perform a single task with the establishment of the logical relationship and sequence of management operations;
- balance sheet methods — systemic consideration of the ratios of income and expenditures, assets and liabilities, savings and losses, etc. by functional areas of activity in a particular community.

It is proposed to assess the informatization level as follows (Formula 2):

$$IP = f(M; Q), \text{ where} \quad (2)$$

IP – informatization level; M – monetary evaluation of information systems and technologies; Q – quantitative assessment of information systems and technologies.

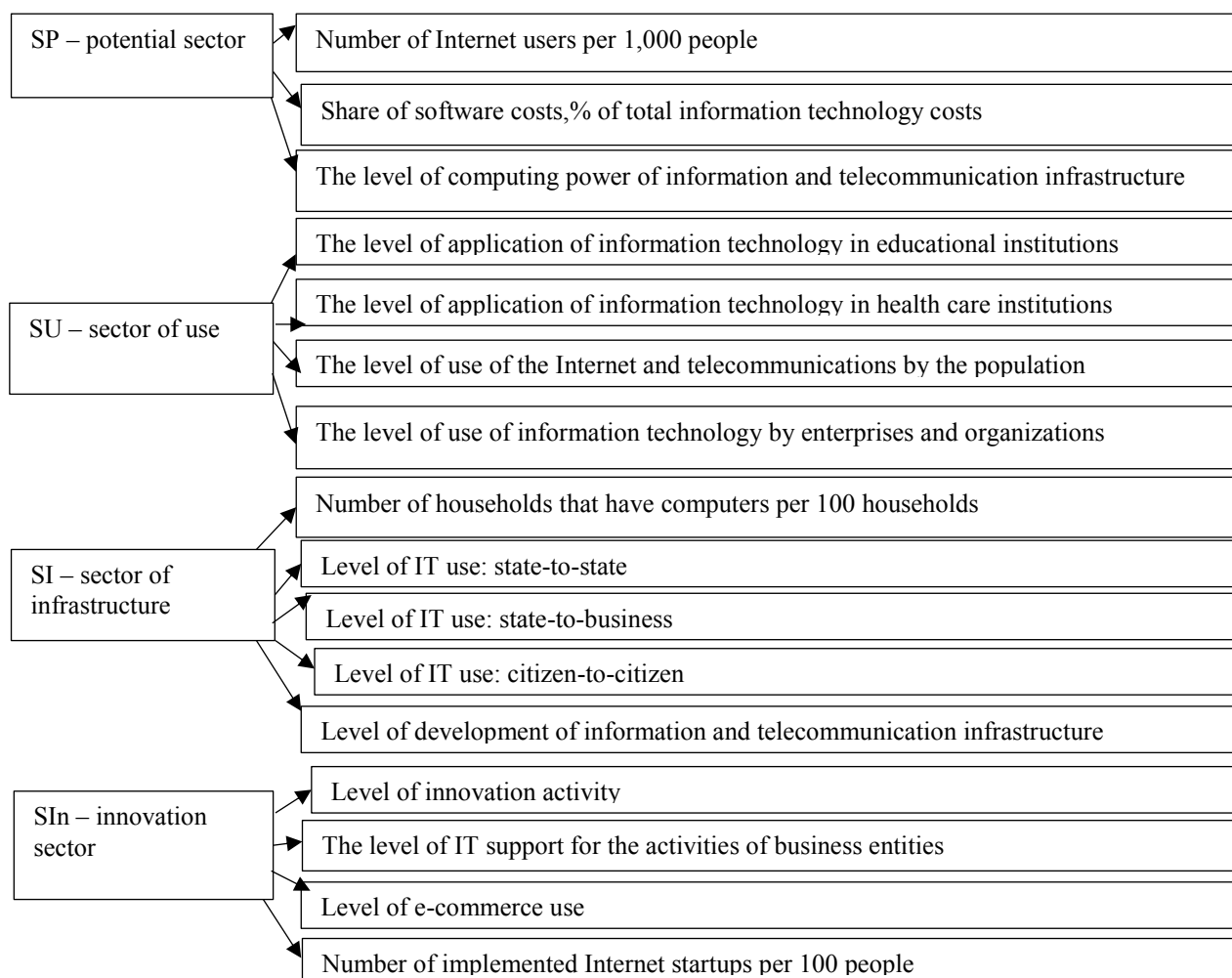


Fig. 2. Information Society Index structure

Professionalization impact assessment is the most socially significant in the solidarity economy. Scientist [18] presented an integrated holistic approach to building a professionalization or professional competence model, which necessitates a comprehensive assessment of the three main pillars: the ability to acquire knowledge, skills and social maturity of each member of the solidarity group. The use of integrated competence model can help to avoid situations of the incorrect application of a business model for community development.

He [18] presented the following formula 3:

$$HQ = f(SQ, AQ, KQ), \text{ where} \quad (3)$$

HQ = professionalization or professional competence level;

SQ = community maturity. We identified the following criteria SQ = SQ1, SQ2, SQ3, SQ4 (ability to make their own decisions, civic position, ability to carry personal and group responsibility, the desire for self-determination);

AQ = applied (practical) skills. We proposed the following criteria AQ = AQ1, AQ2, AQ3 (professional skills, creativity, ability to perform physical work, etc.);

KQ = knowledge. The following criteria were used in the course of our research: KQ = KQ1, KQ2, KQ3, KQ4 (education level, team experience, ability to self-study, ability to teach others). The next step of the study was to analyse the impact of high technology (on the example of a blockchain technology) on a range of social problems that the enterprises can solve in the digital social economy. A total of 3,073 projects that use blockchain technology to stimulate social influence were analysed to determine the prospects for its use in the solidarity economy. The annual reports of the International Labour Organization [19] and the International Centre of Research and Information on the Public, Social and Cooperative Economy, a non-governmental international scientific organization [20, 21], were used for this purpose.

### 4 Results

According to the study which was based on the UN data, the solidarity economy accounts for about 10% of all representative of the EU-27 business

community, and has 160 million members. They provide more than 11 million paid jobs, which is about 6.5% of the working population in the EU-27 (Figure 3).

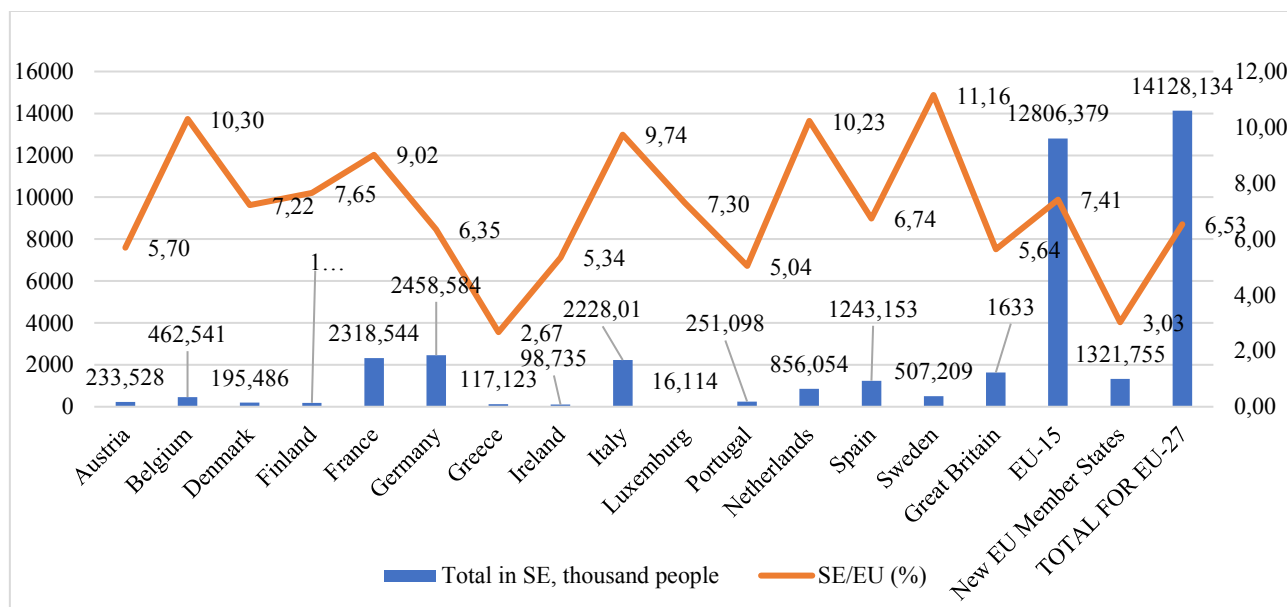


Fig. 3. The number of workers involved in the solidarity economy (SE) in the EU-27 in 2021

In the study, we use the term “solidarity economy” to describe the participation of individuals in organizations or communities. In other words, these are social enterprises with social or environmental well-being as the main purpose.

Social goals are supposed to mean “those determined by the user community”, the active promotion of a “social goal”. Therefore, it is appropriate to show the distribution of participants in the solidarity economy by economic entities in the EU-27 (Figure 4).

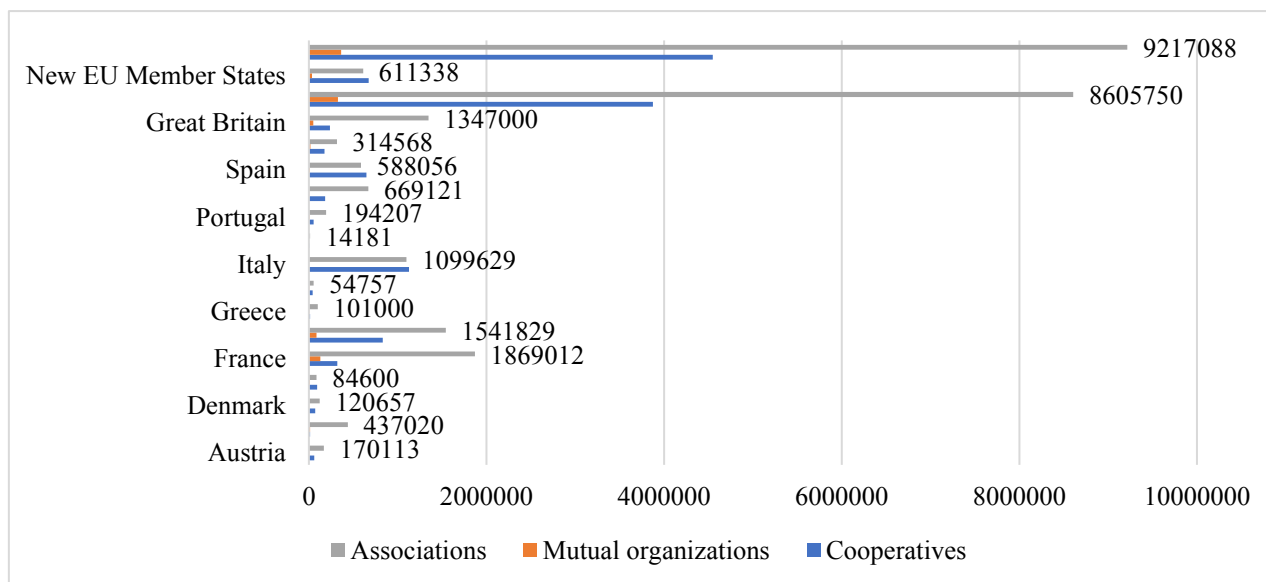


Fig. 4. The number of members of social enterprises in the EU-27 in 2021, persons

The survey included questions on professionalization, informatization and digitalization as indicators of assessing the solidarity economy development. Here, we provide an analysis

of each of the indicators according to the proposed methodology on the example of the EU-27 in 2021. Figure 5 shows the level of digitalization (as an opportunity to access e-government and e-

administration, as well as access to information and e-communication), informatization (as a quantitative and monetary evaluation of information systems and

technologies), and professionalization (as a total indicator of social maturity of the member of solidarity associations, their knowledge and skills).

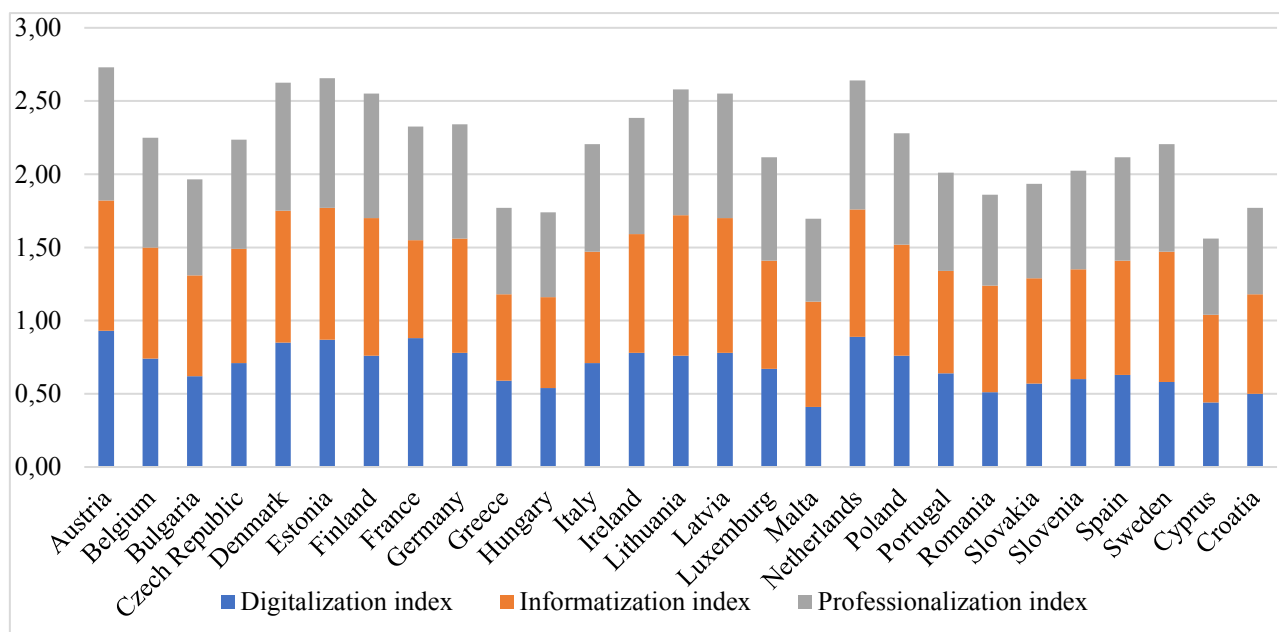


Fig. 5. The indicators for the level of the solidarity economy development in the EU-27 in 2021

The figure clearly shows three groups of countries in terms of the level of development of the determined predictors: digitalization, informatization and professionalization:

- Group 1 — with the highest development rates: Austria, Denmark, Estonia, Finland, Lithuania, Latvia, the Netherlands;

- Group 2 — with the medium development rates: Belgium, Czech Republic, France, Germany, Italy, Ireland, Poland, Luxembourg, Spain, Sweden;

- Group 3 — with low rates — Bulgaria, Greece, Hungary, Malta, Portugal, Romania, Slovakia, Slovenia, Cyprus, Croatia.

A multinomial probit model was used to assess the effect of these determinants (digitalization, informatization and professionalization) independently, and their combined effect in forecasting the efficiency of high technology in a solidarity economy. First, we consider the coefficients at the output of the probit regression in Table 2.

Table 2. The results of the multinomial probit model of the impact of determinants on the effectiveness of the business model of introducing high technology in the solidarity economy

Indicator	Binary value	Coef.	SE
Digitalization level	yes	0.622	0.389
	no	-0.142	0.188

Informatization level	yes	0.428	0.116
	no	-0.211	0.124
Professionalization level	yes	0.816	0.091
	no	-0.599	0.098

The marginal effects of the pre-determined impact factors were interpreted through evaluation of the probability of the dependent variable for the predictor variables, keeping all other predictors constant (Table 3).

Table 3. Analysis of the impact of the probability of the dependent variable on the effectiveness of the business model of introducing high technology in the solidarity economy

Indicator	Variable variation	dy/dx	Std. Err.
Digitalization level	Group I of countries	0.324	0.011
	Group II of countries	0.0961	0.026
	Group III of countries	-0.0441	0.030
Informatization level	Group I of countries	0.261	0.077
	Group II of countries	0.319	0.013
	Group III of countries	-0.0811	0.044
Professionalization level	Group I of countries	0.014	0.031
	Group II of countries	0.239	0.063

	Group III of countries	-0.101	0.019
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Calculations confirm the dependence of the variation variable on the selected predictors, among which the digitalization level ( $r=0.866$ ) is the most important, informatization level ( $r=0.754$ ) ranks second, and the professionalization level ( $r=0.564$ ) is the least important. In other words, the implementation of a business model of using high-tech in a solidarity economy depends more on the technical capabilities for implementing social projects rather than on the level of professionalism of the association members. This undoubtedly expands the boundaries for uniting members of certain communities to meet their own needs.

Historically, social enterprises have evolved from non-profit organizations that began to produce goods and services as a major component of their activities. They also evolved from traditional social economy organizations (especially cooperatives) that have expanded their goals beyond the interests of their members and for the benefit of the community as a whole. The history determined that in some communities social enterprises mainly provide social services, while in other countries they also provide educational, community and general services. Our research shows that social enterprises operate in almost all sectors of the economy, serving the interests and needs of their communities and society (Figure 6).

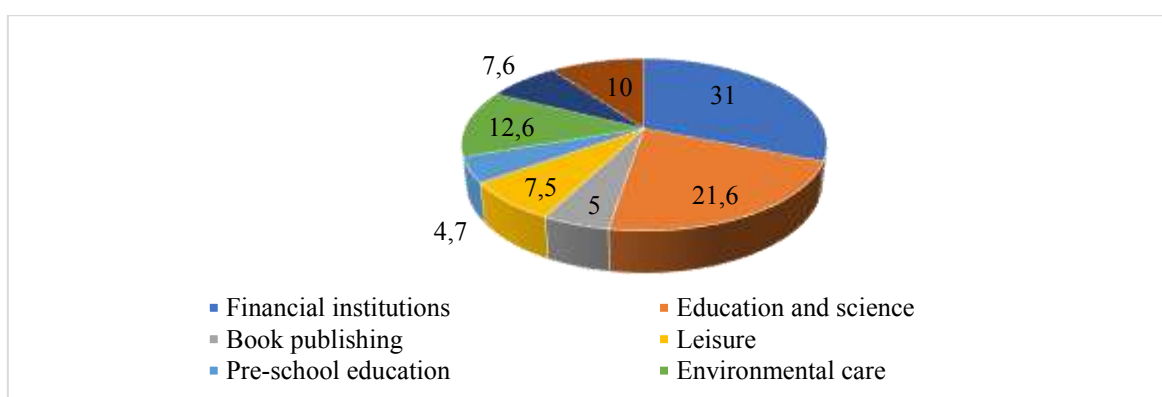


Fig. 6. Distribution of social enterprises in the EU-27 by types of activities in 2021, %

This trend is not unexpected: the solidarity economies have proved to be universal organizations that deal with issues of unmet or inadequately met social needs, and create new social opportunities where other actors are unable to act. They often contribute to smart and sustainable growth, taking into account their impact on the environment and social cohesion for their long-term vision. The entities operating in a solidarity economy are part of the locality, they know and care about the community's needs and play an important role in mitigating the effects of social and technological change. Financial institutions have the largest share, they provide loan services or targeted charitable assistance. Another example is the voluntary assistance provided to the community members in the pre-school education, or the organization of educational activities with the aim of disseminating information about innovative technologies or new activities that are beneficial to society as a whole and encourage the distribution of authority and wealth.

In recent years, social economy enterprises have also begun to operate in the digital field. Although the numbers in the financial sector and alternative energy

are small, we see a sufficient number of applications of digital technologies in the social economy and ecosystems of enterprises and organizations in those sectors. It is in those sectors where the traditional economy usually has a stable income (Figure 7).

The blockchain technology significantly expanded the range of social issues that digital social economy enterprises can solve to allow the use of exchange and preservation of value in addition to information. Our study reviewed 3.073 initiatives that use blockchain technology to stimulate social impact (Table 4).

A total of 20% of the blockchain initiatives examined in this study provide a solution to a problem that would not otherwise be solved without a blockchain, and 86% suggest significant improvements to existing solutions. The study also shows that the blockchain can provide additional (65% of projects) as well as transformational solutions (25% of projects) for some of the biggest current problems (Table 4). Therefore, the obtained values of indicators fully confirm the advanced research hypothesis: the higher the level of socio-economic development of the solidarity economy

model in terms of digitalization, informatization and professionalization, the more efficient socially-

oriented business models that involve high technologies are in a particular territory.

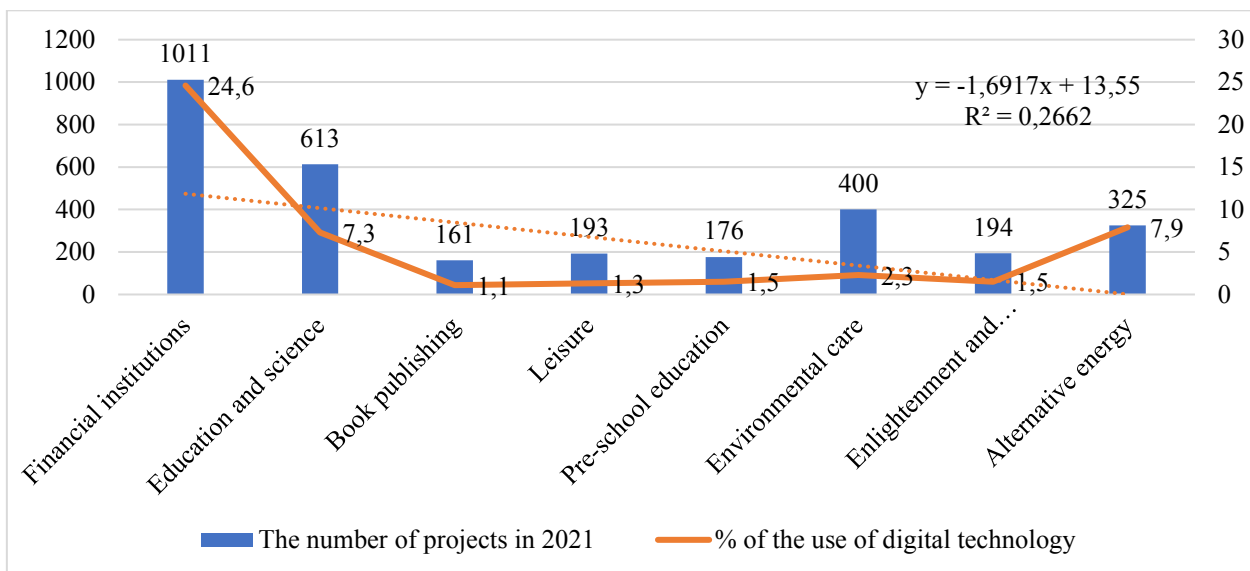


Fig. 7. % of involvement of digital technologies in social projects of the solidarity economy

Table 4. Analysis of the appropriateness of using the blockchain in solidarity economy projects

Areas of application	Possible development options, %				Total number of projects
	Impossible to do without	Possible but difficult	May not be applied	Not appropriate to apply	
Financial institutions	34.3	36.2	18.5	11	1,011
Education and science	5.7	10.6	54.5	29.2	613
Book publishing	1.1	1.9	3.5	93.5	161
Leisure	1.5	1.6	2.3	94.6	193
Pre-school education	1	3.5	5	90.5	176
Environmental care	2.1	3	3.7	91.2	400
Enlightenment and religious activity	0	1	1	98	194
Alternative energy	32.5	43.2	21.4	2.9	325

By analogy with the traditional economy, digital solidarity enterprises are either user-oriented (have some know-how and meet specific needs) or use digital technology to achieve a social goal (such as installing solar panels to light pedestrian streets).

### 5 Discussion

The study confirmed Hudson’s [22] opinion that the solidarity economy is a way of thinking about the economy that opens up space for hope and opportunities for a fairer, more sustainable and democratic economy. It is a new language for building a movement for the economic life transformation [23]. According to the confirmed research data, this is the background for developing a strategy aimed at creating an effective model of the triad of social, environmental and economic

development. Finally, the solidarity economy is a space in which one can imagine, discuss and create a vision of another economy based on shared values [5], but in a collective sense [3].

This article reveals how the latest technologies are becoming a new paradigm in the third sector, how they can become a major tool for changing the behaviour of citizens in resolving solidarity issues. This confirms the main provisions of scientists [8]. The study confirmed that the solidarity economy is far from a magical tool to achieve such changes. Despite all the prospects of its concepts and approaches, the fulfilment of these potentials depends on the professional qualities of the participants [24, 25]. Unlike many theories of radical social change of the past, in which economic transformation seemed embedded in the logic of the



structure itself, revealing through some “historical necessity” or “contradictions within the system” [16, 26], this study proved a synergistic peculiarity of digitalization in the development of economic system with joint participation in the results of work.

There is no doubt that the solidarity economy is an open and contradictory world of ideas and practices: the solidarity economy networks related to subjectivity of the end results remain relevant in the context of the space of common values, discussions and differences. Despite their incredible diversity, solidarity initiatives share a wide range of values that contrast sharply with the market economy values: they encourage more work for social, economic and environmental justice instead of prioritizing profits over everything else.

The aim of the study was not to develop a new economic plan from scratch and then persuade the world to accept it. It was to jointly participate in the ongoing work to strengthen, integrate and build on many existing economic practices of cooperation and solidarity. This is why Alfonso Sanchez’s [4] statement is determinative: “Everyone can start here and now, in their own communities and regions connected to other people around the world, to build and strengthen economic solidarity institutions and relations.”

## 6 Conclusions

According to the study conducted on the basis of the UN data, the solidarity economy accounts for about 10% of the representatives of the EU-27 business community and has 160 million members. They provide more than 11 million paid jobs, which accounts to about 6.5% of the working population in the EU-27.

Three groups of countries were identified according to the level of development of certain predictors: Group 1 — with the highest development rates: Austria, Denmark, Estonia, Finland, Lithuania, Latvia, the Netherlands; Group 2 — with medium development rates: Belgium, Czech Republic, France, Germany, Italy, Ireland, Poland, Luxembourg, Spain, Sweden; Group 3 — with low development rates: Bulgaria, Greece, Hungary, Malta, Portugal, Romania, Slovakia, Slovenia, Cyprus, Croatia.

The results of the study allowed confirming the main hypothesis: the higher the level of socio-economic development of the solidarity economy model in terms of digitalization ( $r=0.866$ ), informatization ( $r=0.754$ ) and professionalization ( $r=0.564$ ), the more efficient socially-oriented business models that involve high technologies are in a particular territory.

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