

Review Paper

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

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ABSTRACT

The study aimed 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. The general research methodology was based on a comprehensive evaluation of the effectiveness of introducing high technology into the solidarity economy according to the following predictors: digitalization, informatization, and professionalization levels. 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, and structural-functional analysis — was proposed as the generalizing evaluation block. The research results confirmed the main hypothesis: the higher the level of socioeconomic 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) and transformational solutions (25% of projects) for alternative energy projects.

HIGHLIGHTS

- ① The article is devoted to determining the positional content of using high technologies in the joint participation of fellow community residents when implementing business processes.
- ② The obtained results showed the relationship between the level of socio-economic development of the solidarity economy model and the effectiveness of the business model of social direction when using high technologies.
- ③ The practical significance of the research lies in its use of the obtained results for a compelling combination of advanced technologies with maximum social effect.

Keywords: Solidarity Economy, Bitcoin, Digitalization, Informatization, Professionalization, Social Efficiency, Advanced Technologies

The global economic and political instability of recent decades has exposed the shortcomings of the current welfare system. It has once again evidenced the need for an alternative or complementary development paradigm. A solidarity economy is a

viable solution to restoring the balance of economic,

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social, and environmental goals (International Labour Office, 2021). Solidarity economy (or Social and Solidarity Economy in RIPESS terminology) refers to a wide range of economic activities that prioritize social significance and satisfaction over purely financial gain (RIPESS, n.d).

The postulates of the solidarity economy are based on the Declaration on Social Justice for a Fair Globalization (BALTA, n.d.) adopted by the International Labour Organization. It states that in a globalized world, “productive, profitable and sustainable enterprises, together with a strong social economy and a viable public sector, are critical to sustainable economic development and employment opportunities.” Therefore, the main principle of the solidarity economy is focused primarily on achieving the stability of the current economic system. It aims at creating enterprises that serve their members or the community, giving preference to people and working on capital in the distribution of income and surplus instead of simply striving for financial gain (Piani *et al.* 2021; Akimova *et al.* 2020).

Rapid and profound changes in the economic worldview caused by 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 (Klymenko *et al.* 2016; Rodchenko *et al.* 2021). These are primarily the issues of maintaining social responsibility and cohesion and accelerating the social and environmental transition.

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. This study aimed 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 implementing innovative solutions in community development based on the solidarity economy principles.

LITERATURE REVIEW

Increasingly more people around the world are experiencing a deterioration in living standards and deepening poverty (Marconatto *et al.* 2019). The logic of capitalism implies the exploitation of people and society as resources. Their value in the form of labor or social relations is reduced to their value in profit maximization (Dash, 2022). According to Alfonso Sanchez (2017), more people than ever realize that capitalism has become an environmentally unsustainable and socially unjust system that cannot guarantee the well-being and decent living conditions of all people anywhere on the planet.

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 (Dubois, 2021). They aim to transform the social and economic system, including public, private, and third—civil — sectors. For this purpose, the solidarity economy can use the best practices that exist in the current system, as well as transform them to serve the well-being of the community based on different values and goals (Pletnev & Nikolaeva, 2020; Kryshtanovych *et al.* 2022). It turns out that the solidarity economy strives for a systemic transformation that goes beyond superficial change, in which radical repressive structures and fundamental issues remain inviolate (Dalla Torre *et al.* 2021; Levytska *et al.* 2022).

Below, we will use the author’s definition of solidarity economy. This complex concept 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. They include all forms of commercial and social associations that satisfy the needs of members of a solidarity formation in goods, services, and knowledge.

The solidarity economy as a global movement aims at building a just, democratic, and sustainable

economic system, giving people and the planet priority over income (Gaman *et al.* 2022; Gavkalova *et al.* 2022). This is achieved through the support of local business initiatives and mutual support network. Cooperatives lie the foundation of the solidarity economy. Dalla Torre *et al.* (2021) note that most cooperatives have failed due to sabotage, outdated technology, management problems, and insufficient capitalization.

The advanced technologies are designed to have a significant impact on traditional citizen unions in the short term, forcing the eradication of inefficient and outdated entities. At the same time, new technologies introduce destructive changes in our current society and change how we treat each other (Eizaguirre Anglada, 2021).

Because of the social vector of solidarity economy development, researchers (Kalyayev *et al.* 2019; Villalba-Eguiluz *et al.* 2020) call it a method for conceptualizing global transformational monetary qualities, practices, and fundamentals. These include digitalization and other advanced technologies that are increasingly changing the economy (Baranauskas & Raišienė, 2021). A blockchain 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 (Oberhauser, 2019). Blockchain technology, which is based on building a blockchain, allows digital decentralized sharing of datasets and managing the value of assets or goods without the need to depend on a trustee that centralizes the process. So, the blockchain establishes a system of group trust as a decentralized distribution system, because the information is distributed between different agents, and it cannot be changed.

Besides, the blockchain has an internal approach to decentralization. It can generate high social-added value through tracking of product transfer links and 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 (International Labour Office, 2017).

Oberhauser (2019) states that both the platform user evaluation model and the decentralized blockchain network are well aligned with the social economy principles, especially cooperatives. 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 (Brulisauer *et al.* 2021; Deyneha *et al.* 2016).

So, the latest social technologies of the solidarity economy can be defined as follows: they are innovative software products, information processes, methods, or methodologies developed in collaboration with the community, which are effective solutions for social transformation.

Gkagkellis (2021) grouped the main elements of high technologies of the solidarity economy. According to him, they should:

- ♦ Be logically applied in the business environment and should be cost-effective within a particular community or collective organization;
- ♦ Develop the framework of cooperation of scientific and popular knowledge;
- ♦ Be defined in the context of the technological society with the involvement of state institutions.

Therefore, it seems logical to use advanced technologies, including digital services, in the system of mutual interaction and partnership for the common good among stakeholders united by one goal.

MATERIALS AND METHODS

The general research methodology is based on a comprehensive evaluation of the effectiveness of introducing high technology (digitalization, informatization, professionalization) into the solidarity economy. Fig. 1 shows the block diagram of the study developed for this purpose, indicating the evaluation criteria.

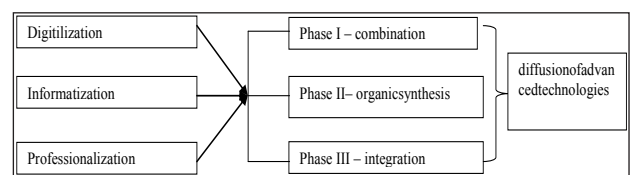


Fig. 1: System integration phases of evaluating business model of advanced technology introduction into the solidarity economy

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	Providing the population and business with high-quality state information services without unnecessary restrictions on access or additional fees for obtaining information	E-government Index, calculated by the UN for each country or region https://publicadministration.un.org/egovkb/en-us/data-center
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 is a kind of standard criterion against which the information security in the country (information availability, information technology development) is compared (Fig. 3). The index is posted on the site http://www.idc.com/groups/isi/main.html

The impact of digitalization on the state of solidarity economy development indicators was studied from the perspective of access to cloud technologies and the creation of “digital social enterprises”. This will ensure the decentralization of cooperation and increase community efficiency. It was proposed to evaluate the level of digitalization of the solidarity economy development using the indicators listed in Table 1.

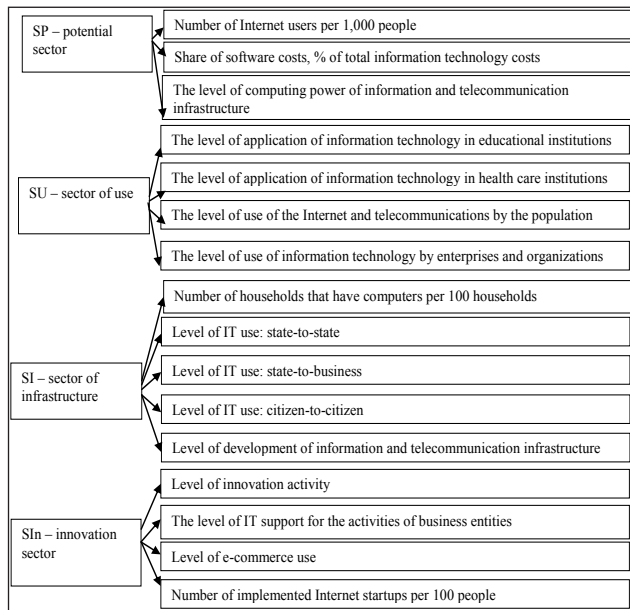


Fig. 2: Information Society Index structure

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

$$ISI = f(SP; SU; SI; SIn) \dots(1)$$

where, *SP* – solidarity economy potential sector; *SU* – sector of use; *SI* – infrastructure sector; *SIn* – solidarity economy innovation sector.

The level of informatization (information potential) of the solidarity economy is the basis for developing management potential, and its technical and technological components. Such a symbiosis of components will ensure thorough and full-fledged managerial decision-making (Devece et al. 2017).

A group of methods aimed at the system of economic organization was chosen to evaluate the impact of informatization on 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, losses, etc., by functional areas of activity in a particular community.

The review of scientific achievements reveals that the assessment of information potential involves indicators related to the number of computers, Internet connection, etc. (Van Den Berg & van Winden, 2017). Nowadays, computer and information technologies have penetrated so deeply into all spheres of life that no social and political process takes place without them (Ladonko et al. 2022). Therefore, we consider it inappropriate to take these indicators into account. We believe that qualitative rather than quantitative indicators of computer technologies should be considered,

such as: the production of competitive software by domestic IT companies; the use of only licensed software in all areas of the economy; patenting of domestic inventions; conducting public tenders.

It is proposed to assess the informatization level as follows:

$$IP = f(M; Q), \quad \dots(2)$$

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

Professionalization impact assessment is the most socially significant in the solidarity economy. Porvazník (2018) 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. Using an integrated competence model can help avoid situations of incorrect application of a business model for community development.

Porvazník (2018) presented the following formula:

$$HQ = f(SQ, AQ, KQ) \quad \dots(3)$$

where, *HQ* = professionalization or professional competence level; *SQ* = community maturity.

We identified the following criteria *SQ* = *SQ1*,

SQ2, *SQ3*, *SQ4* (ability to make 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 during 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 analyze the impact of high technology (on the example of blockchain technology) on a range of social problems that enterprises can solve in the digital social economy. A total of 3,073 projects that use blockchain technology to stimulate social influence were analyzed to determine the prospects for its use in the solidarity economy. The annual reports of the International Labour Organization (ILO, 2021) and the International Centre of Research and Information on the Public, Social, and Cooperative Economy, a non-governmental international scientific organization (Migliaro, 2019), were used for this purpose. The generalizing unit of evaluation involved the use of complex research methods to achieve the aim: situational analysis, systems analysis, reproductive analysis, structural-functional analysis

All the indicators referred to in the study allowed

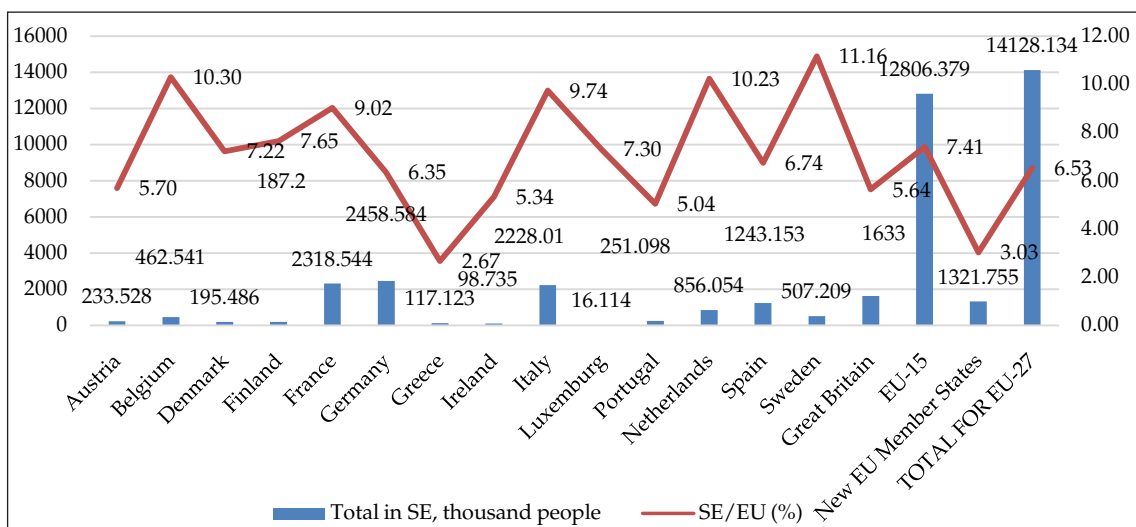


Fig. 3: The number of workers involved in the solidarity economy (SE) in the EU-27 in 2021

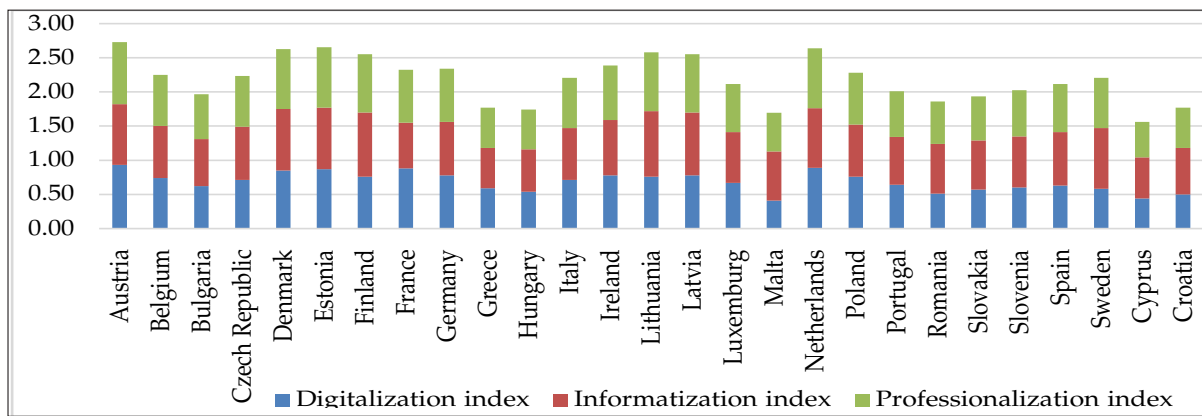


Fig. 4: The indicators for the level of the solidarity economy development in the EU-27 in 2021

us to advance the central hypothesis: the higher the level of socio-economic development of the solidarity economy model in digitalization, informatization, and professionalization, the more efficient socially-oriented business models that involve high technologies are in a particular territory.

RESULTS

According to the study, which was based on the UN data, 160 million people from 27 EU countries are members of the solidarity economy. That is 6.5% of the working population, or 11 million tax-paying jobs (Fig. 3). 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 primary purpose. Social goals are supposed to mean “those determined by the user community”, the active promotion of a “social goal”.

The survey included questions on professionalization, informatization, and digitalization as indicators of assessing solidarity economy development. Here, we provide an analysis of each indicator according to the proposed methodology on the example of the EU-27 in 2021.

Fig. 4 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 solidary associations, their knowledge, and skills).

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, and 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 evaluating the probability of the dependent variable for the predictor variables, keeping all other predictors constant (Table 3).

Calculations confirm the dependence of the variation variable on the selected predictors, among which the digitalization level ($r = 0.866$) is the most important, the informatization level ($r = 0.754$) ranks second, and the professionalization level ($r = 0.564$) is the least important. In other words, implementing a business model using hightech 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 specific communities to meet their own needs.

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

Historically, objects of the solidarity economy were transformed from non-profit organizations under the influence of socio-economic factors. In some communities, social enterprises primarily provide social services, while in others, they also provide educational, community, and general services – so, for example, cooperatives that meet not only the needs of their members but also other residents of the community. Our research shows that social enterprises exist in all sectors of the economy (Fig. 5).

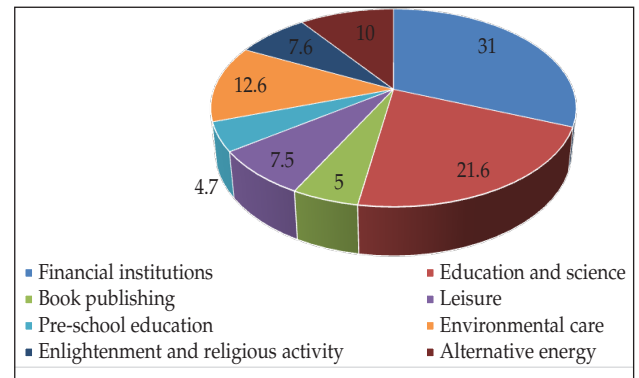


Fig. 5: Distribution of social enterprises in the EU-27 by types of activities in 2021, %

This trend is not unexpected: solidarity economies have turned out to be universal organizations that provide various needs, most often in the triad of socio-ecological-economic direction, which will ensure the sustainability of community development in the long term. The entities operating in a solidarity economy are part of the locality; they provide coverage of community needs and produce socio-economic changes. Financial institutions have the largest share; they provide loan services or targeted charitable assistance. Social economy enterprises have also begun to operate in the digital field in recent years. Although the numbers in the financial sector and alternative energy are small, we see enough applications of digital technologies in the social economy and ecosystems of enterprises and organizations in those sectors. Namely, in those sectors where the traditional economy usually has a stable income, Blockchain technology has dramatically expanded the range of social problems, and enterprises of the digital solidarity economy create additional opportunities for information exchange. Our study reviewed 3,073 initiatives that use blockchain technology to stimulate social impact (Table 4).

In general, the research results confirm the well-known Pareto efficiency: 20% of blockchain initiatives are necessary processes, and 80% are only auxiliary processes that help solve the problem. 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

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

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.

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). Thus, the innovations of the digital solidarity economy allow users to be direct moderators of digital changes and ensure the transformation of the quality of people life quality in society.

DISCUSSION

The study confirmed Hudson’s (2021) opinion that the solidarity economy is a way of thinking about the economy that opens space for hope and opportunities for a fairer, more sustainable, and democratic economy. It is a new language for building a movement for economic life transformation (Bauhardt, 2018). According to the confirmed research data, this is the background for developing a strategy to create 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 (Dubois, 2021), but in a collective sense (Dash, 2022).

This article reveals how the latest technologies are becoming a new paradigm in the third sector, and

how they can become a major tool for changing the behavior of citizens in resolving solidarity issues. This confirms the main provisions of Dalla Torre *et al.* (2021). 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 fulfillment of these potentials depends on the professional qualities of the participants (Gkagkellis, 2021; Rakopoulos, 2016). 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” (Brulisauer *et al.* 2021; Saner *et al.* 2019), this study proved a synergistic peculiarity of digitalization in the development of an economic system with joint participation in the results of work. This is confirmed by the quotation from Eizaguirre Anglada (2021): “If solidarity economy is to succeed, it will be a product of courage, struggle, and collective creation.”

There is no doubt that the solidarity economy is an open and contradictory world of ideas and practices: the solidarity economy networks related to the subjectivity of the results remain relevant in the context of the space of shared values, discussions, and differences (Zoska *et al.* 2020). 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.

CONCLUSION

According to the study conducted on the basis of the UN data, 160 million people from 27 EU countries are members of the solidarity economy. That is 6.5% of the working population, or 11 million tax-paying jobs.

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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