

# Training based change management problem for social innovation

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## ABSTRACT

The geopolitical transformation in Eastern European countries has created greater social tensions than ever before, and resolving them is a constant challenge for the governments of the region. In this situation, researches on social innovation in support of economic development have become very important. The authors have been studying social innovation for nearly 8 years, with particular reference to the methodology for measuring and generating innovation potential at mezo level. One of the main directions of our research is the neuro-fuzzy model based on social learning, which defines possible social innovation solutions in a settlement-specific way. The other area of study is the change management process within which defining an appropriate training strategy and concept is one of the relevant issues in managing resistance in the operation and management of the settlement. This article presents a novel multi-level, value-driven training model that is based on special logic and can serve multiple target groups. Its applicability was tested in 52 settlements. We describe good practice implemented in a typical segregated community.

**Keywords:** social innovation, neuro-fuzzy model, social learning, change management process, value-driven training model

## 1. INTRODUCTION

Technological and economic innovations cannot respond to all social challenges. Natural and material resources are becoming more and more scarce, so it is necessary to use investment assets, maximizing social and economic efficiency. It is a major task to address the backwardness originating from regional disparities and to create opportunities for catching up in peripheral regions. There is a correlation between the economic capacity of the given region and its ability of innovation [1]. However, innovation (the search for new and innovative solutions) needs to be interpreted more broadly than before.

In line with social changes, the European Union pays more attention to the context of social innovation than before. There is a need for a paradigm shift; besides the R&D activities in

technical and natural sciences, which require more and more investment, there is a need for new, innovative solutions to address the social and economic problems of a given community (settlement, region).

According to the Europe 2020 program the strategic goal of the European Union is to increase the employment rate to 75% among the population aged 20-64 and, at the same time, to increase employability by 2020 [2]. Employability is closely related to the standard of education qualifications, this way one of the strategic objectives is specifically to reduce the proportion of those with low educational attainment. By 2020, the target is to reduce early school leaving to 10%, and to increase the rate of participants in tertiary education to 40%. Particular emphasis is placed on reducing the proportion of 18-24 year olds leaving secondary education / vocational education, which represents, on average in the EU, less than 10% of the age group according to the stated objectives.

Hungary has also undertaken, with the help of the National Reform Program, to reduce the proportion of early school leavers to 10% by 2020. To this end, the Hungarian Government urges the development of specific interventions and supports the improvement of the quality, efficiency and effectiveness of the education system. Besides that "generation Z students have their unique and distinct characteristics which subsequently influence the approach that they have towards work and education" [3]. Nowadays it has become increasingly well-known that several basic problems of the economy and society affecting the big scope of society, like educational inequalities, are impossible to be solved without novel cooperation between the social stakeholders, without the direct creative participation of citizens, or without social innovation. In the process of social innovation, the idea of the innovation and the resources that can be mobilized for implementation, the innovative organizational framework of implementation and sustainability are equally important [4].

Our research focuses on the hypothesis that coping with social problems can only be supported by a complex social learning process based on value-, age- and prequalification-specific knowledge management. Our study summarizes a possible model of this type and the experience gained during its application.

## 2. CONCEPT OF SOCIAL INNOVATION

Theoretical background to the concept of innovation appeared in Schumpeter's Theory of Economic Development in 1912. Schumpeter considered the entrepreneurial activity to be the essence of the business cycle, which leads to imbalances through innovation, and the subsequent spread of innovation and adaptation to the economy creates a new equilibrium. He combined the theory of innovation with the theory of creative destruction and defined the entrepreneur as creating a new product or service by combining existing factors in a novel way. Ogburn [5] interprets a particular combination or modification of cultural elements in society as an endeavour to renew society. The prominent role of social initiatives was also examined by Dénes Gábor in 1970 [6], who analyzed scientific, technical, biological and social innovations and concluded that technical innovations were significantly divided from social innovations. According to him, the predominance of technical innovation has caused disproportion in the innovation process, as efforts to increase social welfare have fallen behind and have been pushed to the periphery. In his interpretation, social innovation is a comprehensive framework program, which primarily is not a parallel initiative to technical innovation, but a "reform" that controls and regulates all innovation [6]. The theoretical definition of social innovation emphasizes the need for innovation in all areas of life, and innovation initiatives must not be limited only to the technical and economic spheres [7]. In the 1970s, the concept of social innovation received particular attention (Rosanvallon, Fournier), emphasizing the role of social transformation in problem solving [8]. Social initiatives are novel solutions to people's problems [9]. Zapf [10] and Bagnasco and Sabel [11] emphasize the fundamental importance of cooperation, innovative and cooperative social task-solving (in terms of social and economic innovation).

The definition of the levels of social innovation is supported by the European Commission's study of social innovation in the following cases and in the form of implementation [12]:

- social innovation as a bottom-up organization involving NGOs,
- social innovation as a response to social values to community needs,
- social innovation as a process leading to renewal and transformation of society.

The above categories demonstrate that the focus of social innovation efforts is to meet the needs of the community and to solve their problems, while the narrower idea is interpreted exclusively as a grassroots, citizen engagement process. Social innovations, which can also be found in the new approaches of society and in structural transformation, are often created from the top by the action of macro-level measures. This finding also predicts the grouping that differentiates the micro- mezo- and macro levels of social innovations.

## 3. SOCIAL INNOVATION PROCESSES

Technology nowadays is increasingly embedded throughout society, and is becoming commonplace in almost everything we do in everyday life but without social innovations, it is difficult to solve social challenges [13]. The full examination of the process of social innovation is a relevant task [14], for two reasons: on the one hand, social innovation efforts have multiplied and are increasingly addressing the management of

social challenges, on the other hand, the process of social innovation is in itself a change that results in unimaginable new solutions that are not yet known. The basic criterion of the social innovation process is that it should be a novel initiative. This does not necessarily mean a completely new solution, but a novel combination of previously well-functioning routines that meet the occurring social needs, thus creating new skills [15, 16, 17].

The social innovation process can be captured along two polarities [14]:

- incremental or radical change: similarly to technological innovation, the proposed change can take place within previously known frameworks (incremental innovation) or out-of-frame efforts (radical innovation)
- top-down or bottom-up initiative: the starting point for the innovation process is the person or group of people who will trigger the change process. If it is a researcher or a political decision maker, the process is top-down, but if it is (typically) based on the involvement of people and small communities, the initiative is organized from below. Hybrid social innovation processes are created through the combination of top-down and bottom-up processes.

Social innovation is a cyclical, dynamic process through feedback. Figure 1 illustrates the logic process of social innovation, showing the most important feedback elements.

The initial step in the process of social innovation is the situation analysis that consists of three steps: compiling a map of social problems, identifying innovation potential and resource analysis. These can be accomplished through municipal / district-level economic and social databases, municipal / district-level potential resource matrices. Community needs, social challenges, non-market solutions and guided governmental measures, as well as the target hierarchy formulated on the basis of these will mean the next step in the social innovation process.

Efforts are basically not market based solutions, but they are initiatives that also result in the renewal of the society that form the community in the long run. Risk management can also be seen as an input factor at this stage. The following step is to examine the possible and proposed solutions with the help of expertise. This is the most uncertain phase of the social innovation process, which is constantly challenging the stakeholders. After practical compliance, social efforts become adaptable, then extension takes place and multiplicative effect appears. At this point in the process, the supportive atmosphere (resources, institutions, political and social framework conditions) and proper communication are important factors.

Successful implementation of the social initiative leads to a changing (learning) process as a result. During the process, it is necessary to consider and evaluate the risks, to develop strategies for their reduction or elimination. Following the successful implementation, new needs emerge that can be met by the socially innovative community along the above process. Therefore, social innovation is a dynamic process that results in social learning through feedback loops and constant risk assessment [18].

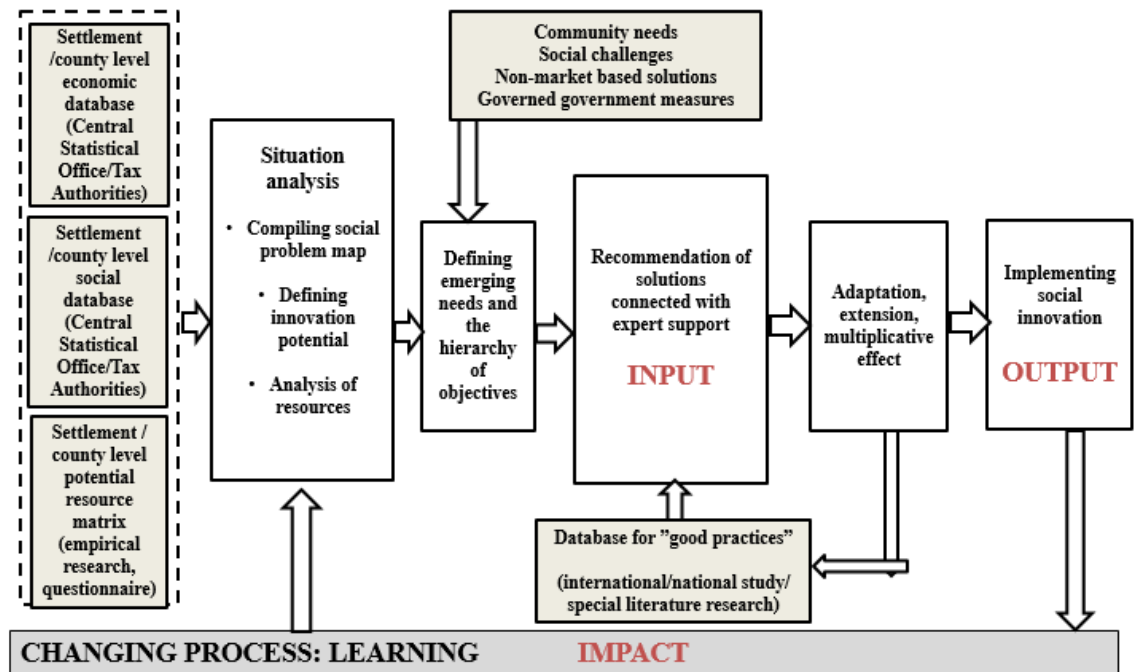


Figure 1 Social learning and social innovation

Source: own compilation

#### 4. SUPPORTING SOCIAL INNOVATION THROUGH EXPERT SYSTEMS

In our research, we have come to the conclusion that it is advisable to support the phase involving the creation of social innovation with the help of IT solution because of the huge amount of data to be processed, i.e. the introduction of a support system is required. "The information age has shifted the very foundations of interactions and interchanges between people in a society" [19]. To set the model, we first defined what aspects and conditions apply to the input data and what we want to achieve. In order to select the appropriate system, we reviewed the hierarchy of needs for social innovation, taking into account the indicator groups and indicators required to determine the social innovation potential. We have identified potential areas for social innovation: education, healthcare, employment, housing, social capital and networks, political participation, environment.

What could this "expert support" be like? Expert systems are computing systems that emulate the human expert's inference process in a well-defined professional field. The primary purpose of establishing expert systems was to make the experience, competence and problem-solving skills of experts in certain fields accessible and understandable to those without experience in the field. In addition to being available, these systems can be used for supporting consultational, diagnostic, decision support learning or research activities. The idea of expert systems is related to classic artificial intelligence research. Expert systems generally use a knowledge base of IF-THEN type rules, where the logical symbols are essentially based on logic following the BOOLE algebraic structure. The disadvantage of expert systems

is that the symbols used do not fit well with the modelled phenomenon. Since the majority of the management tasks involves working with variables that are of continuous value set and analogue, the formal description of these values would require infinitely many symbols.

The great advantage of fuzzy expert systems over classical expert systems is that there is no need to use such a large number of symbols, however, each symbol is assigned to membership functions which, as they move away from the typical value assigned to the symbols, have less and less truth value. These are always fuzzy sets, fuzzy numbers or fuzzy intervals [20].

As a result of this methodological study, we chose to use fuzzy logic. The fuzzy system is able to handle multiple data types at a time and can be perfectly combined with decision trees, which is the basis of our model. Fuzzy applications have already appeared, for example, in medical biology, insurance risk assessment and many other areas of life. In this respect, our approach to use them in generating social innovations can be considered novel. Following fuzzy logic, other sub-symbolic artificial intelligence methods have also emerged, primarily neural networks, evolutionary programs, genetic programs etc., which are often combined and collectively known as soft computing.

The advantage of the fuzzy control system is that the model can be set up directly by monitoring input-output pairs, and can be installed by tuning the quasi-optimal control algorithm. The disadvantage is that such a model can only be approximate.

After reviewing several neuro-fuzzy models, we chose the Falcon method, which is capable of learning both parameter and

system rules. In the Falcon feed-forward network, the fuzzy weights characteristic of the input and output membership functions are built in neurons, so that instead of one there are three hidden layers, two of which are currently interpreted. Figure 2 illustrates the logical structure of the model:

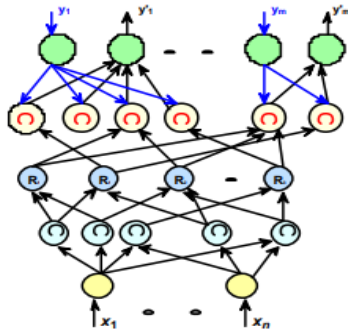


Figure 2 The logic structure of the neuro-fuzzy model

Source: [21]

In our study, the neuro-fuzzy model, i.e. the fuzzy logic controller based on neural network can be characterised by:

- the 1st layer: (the input functions of the model) the area of the settlement; the number of inhabitants and their distribution by age; marital status; economic activity (number of workers, unemployed people); level of flat equipment, being the part of the sewerage or water supply system;
- the 2nd layer: whether the settlement has facilities for medical care and entertainment, such as cinema, library, museum etc.

The first step was the creation of a knowledge base, a database of existing good practices. It contains objects with their structures, fields, and attributes that are connected by fuzzy functions.

Certainly this database should constantly be updated with new good practices and statistical data. The good practices shown in the knowledge base need to be categorized, which in our case took place in line with:

- the form: technology, product, service
- the aim: enhancing the quality of life (according to a needs hierarchy)
- the level: mezo
- the way of financing: state, private, funded
- the innovator: civil organization [20].

The input functions of the model's pilot introduction are the area of the settlement, the number and age distribution of the population, marital status, economic activity (workers, unemployed people, dependents), the level of equipment of the flats, agricultural area, forest. In the second round, we examined whether there are facilities for medical care and entertainment.

In our study, the neuro-fuzzy model has 3 layers which combine the quantitative and qualitative data (Figure 3):

- change architecture
- values (elimination of prejudices, attitude change)

- training level/relationship (network)
- training types (online, e-learning)
- training structure
- training target groups

## 5. SOCIAL INNOVATION AS A CHANGE MANAGEMENT PROCESS

By treating the creation and operation of social innovation as a change management process, it can be stated that all its features are also present in this case, however, a concept of special knowledge management solution is described above (Figure 4). Our value-driven training model focuses on the knowledge transfer involving disadvantaged students in tertiary, secondary and primary secondary education.

We undertake the transfer of knowledge of e.g. business or institutional systems for the successful implementation of social innovations among selected university students accepting the task, who, with our mentoring, pass on the knowledge they have acquired to secondary school students living in their settlements in the same conditions, who also forward this knowledge to primary school students taking part in the pilot project [22].

In this way, the realization of economic development innovations takes place through learning participation in a multi-level training structure, together with innovators and funders, generated by our Fuzzy model.

Its phases are novel due to a strong focus on activities in the knowledge management value chain, which can contribute to the formation of a new community in the settlement and to keeping young people in the region.

Other participants also need trainings, counseling and sensitization to create and operate social innovation, which is also a relevant part of the project, which we carry out as follows.

### 1 Training for the leader(s) of the settlement

Basic concept: an information training for the leaders of a given settlement, in which we present the importance of regional development, its opportunities and the possible scenarios of becoming an innovator. The purpose of the training is to inform the leaders of the municipalities about the innovative way of thinking and the practical implementation of the "mayor = innovator" theory.

### 2 Basics of starting a business

Basic concept: mentoring an enterprise in a given settlement as a social innovation, supporting economic development measures. Following a thorough analysis of the situation (analysis of individuals to be involved, locations and business ideas), the program aims to examine start-up issues for a business, provide the related knowledge, as well as prepare a business plan and a feasibility study.

### 3 Investigation of inter-municipal cooperation

Basic concept: network connection analysis by analyzing inter-municipal cooperation. The study supports the identification of potential areas and opportunities for new social and cultural innovations. The aim of the program is to develop a process based on mapping the synergy effects of horizontal networks and to create a model network concept that will lead to a joint cultural event aimed at meeting higher public education needs through event organization tasks and that is the part of the complex catching up model concept.

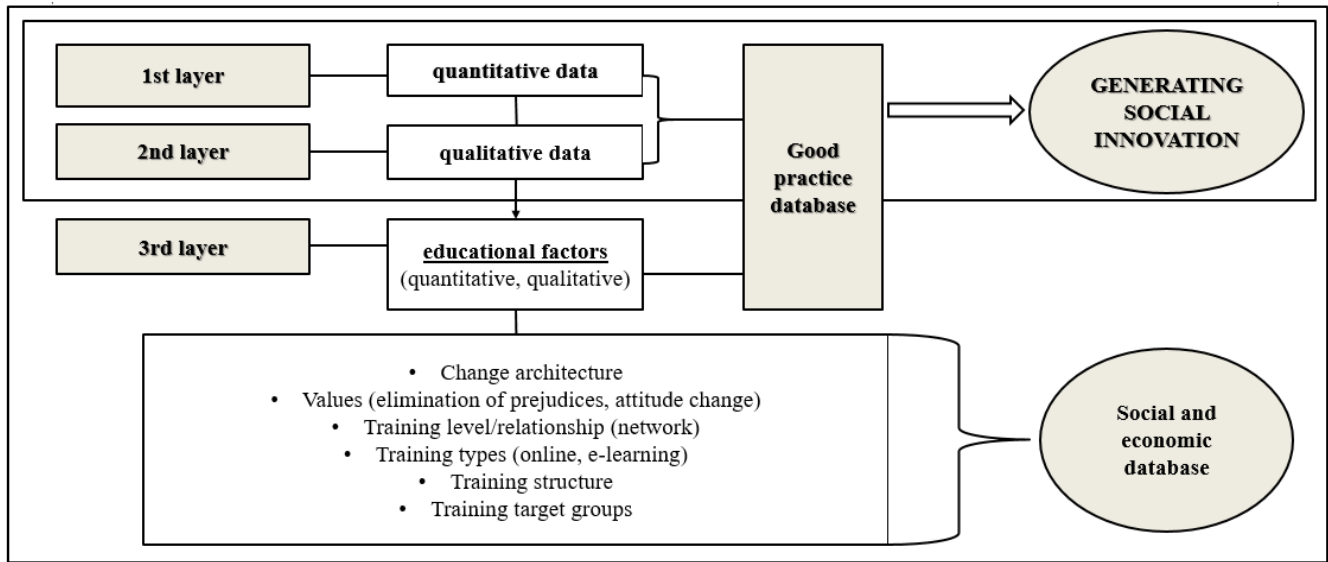


Figure 3 Supporting social innovation through neuro-fuzzy logic

Source: own compilation

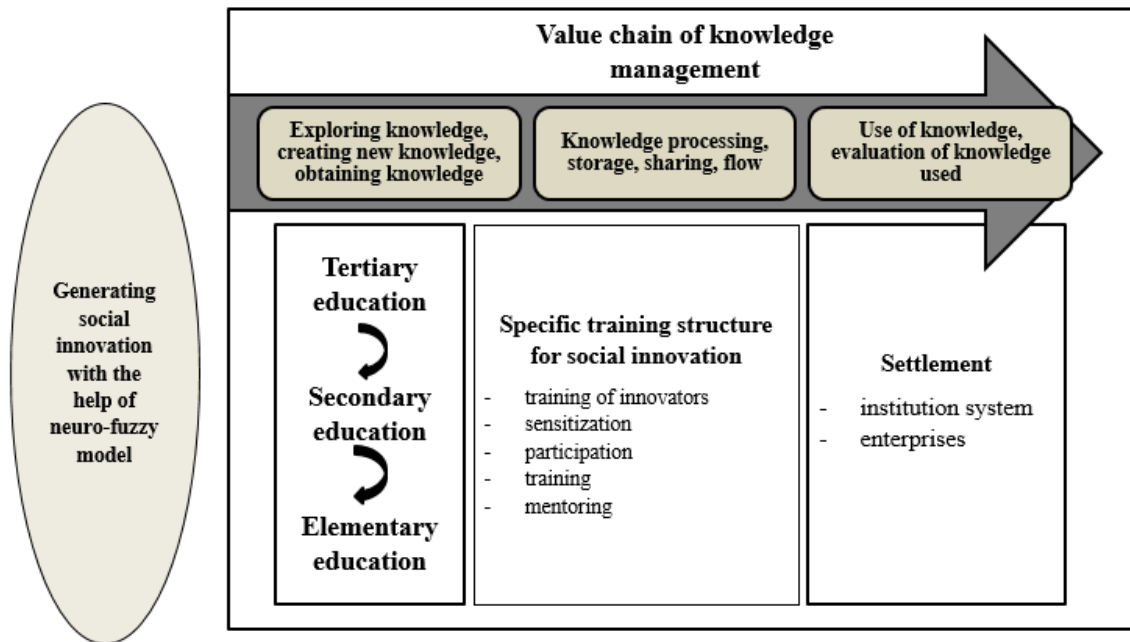


Figure 4 A value-driven training model for supporting social innovation

Source: own compilation

## 6. GOOD PRACTICE

A study carried out in a small Hungarian town (with the population of 12 thousand) with several segregations has identified problems with regard to education and employment in three areas:

- since 2011 the state has been organizing primary education instead of the local government, which led to significant segregation in the case of the settlement (Roma and non-Roma schools),
- the perception of vocational training in terms of the labor market has deteriorated, due to the weakening knowledge of the students, which requires immediate intervention,
- on the basis of the assessment of the competence needs at local companies and enterprises the implementation of university training is required.

In 2015, a complex program was launched in the town to improve the living conditions of Roma communities. During its social innovation efforts, the town identified interventions that integrated the infrastructure deficiencies of the residential areas, the labour market, education, health and other problems of the disadvantaged population. Within the framework of so-called soft interventions for the social integration of disadvantaged people, various labour market training, measures aimed at the employment of long-term unemployed and civil society development programs have been implemented. The novelty of the interventions was that the development of the programs was preceded by various professional forums, roundtable discussions (enterprises - municipalities - disadvantaged people) and open days. Socially innovative solutions have emerged that are based on real social dialogue and partnership, where the partnership goes beyond the usual forms and creates truly active thinking.

In the field of employment, the following short-term objectives have been set [4]:

- providing detailed information on training and professions to disadvantaged groups,
- presenting positive examples to disadvantaged groups,
- vocational training of members of disadvantaged groups, as required by employers,
- introducing mentoring among stakeholders,
- developing a talent management process among stakeholders,
- defining the framework conditions for a scholarship scheme.

In connection with the above objectives, the following long-term objectives have been set in the field of employment [4]:

- ensuring the presence of Roma workers in all areas of the labour market,
- inclusion of open and inclusive employers to the program,
- providing a well-trained, motivated, disciplined and qualified workforce from members of disadvantaged groups. In the case of the population, the low level of education and the lack of qualifications is a critical point. In order to increase social welfare, short-term and long-term goals have been identified during the program.

Long-term goals in education are as follows [4]:

- children aged 6-18 should have access to the training according to their abilities,
- integrated education,
- motivated parents and children,
- preventing children from dropping out of school,
- cooperation between the institution and the parent,
- support,
- elimination of prejudices.

Short-term goals in education are as follows [4]:

- improving communication between actors,
- taking care of Roma values and culture,
- getting parents to be involved in school programs,
- visiting families, giving assistance,
- mentoring (involving Roma parents),
- programs to help taking responsibility for their own life,
- creating a computer workshop,
- having a subject of Health Education at school
- life management programs for parents.

On the basis of the plans of the settlement, a talent promotion is implemented through mentoring and scholarship support in training skilled workers. Mentoring, in line with the competency needs expressed by local businesses, also includes development that helps students take part in university training and work assignments, through dual training.

Related to this, a program called the DIY Life Cycle has started, which has the slogan: DIY your life - from simple techniques to professional implementation! The goal of the program is to provide students with a workshop that provides opportunities from simple DIY tasks to trying out professional manufacturing processes for those over the age of 14. They designed a DIY workshop for a secondary school where various hand tools, drills and milling machines, foam cutters, circular saws, circular grinders, and even 3D printing can be tried. According to the plans weekly workshops would be held in the workshop where students could participate in the production process with volunteers (e.g. teachers, academics, technicians). They would also organize motivational lectures, which would also provide students facing school choice with career guidance support. The joint DIY activity would provide an opportunity for an exchange of experience. The municipality, secondary schools and the university participate in the organization. The most important innovative element of the workshop is the opportunity to gain real experience and use tools that are not available in everyday practice. While students get to know some stages of the production process, their own experience and the experiences told by others all help guide the career path. Volunteers take part in the education, which, besides providing assistance and presentations, among other things, provide an opportunity to identify and educate outstanding talents. In the course of their activities, the municipality and the school have found an empty building that can provide a suitable space for the workshop. Recruitment of volunteers (local practitioners, academics, school teachers) has begun. The list of tools has been finalized and the procurement has also started. As a first step, the program was announced with the help of the municipality and the tenders. School programs were organized in which the goals and possibilities of the DIY workshop were presented in a short presentation. The volunteers carry out a competence assessment of the students. After the formation of the practice groups, teams of volunteers (teacher, trainer, coach, etc.) would present the program during an open day. They would organize an open workshop each month.

<b>General information</b>	<b>Name / Title</b>	Provide talent promotion for disadvantaged students through civil society organizations, businesses and citizens in innovative municipal structures.
	<b>Contacts</b>	municipal official
	<b>Objective</b>	Provide disadvantaged Roma children with talent promotion and increase support.
	<b>Target group</b>	A disadvantaged Roma community in a settlement of Szabolcs-Szatmár-Bereg county
	<b>Target region</b>	Settlements in Szabolcs-Szatmár-Bereg county
	<b>Necessary human resources</b>	local government officials, local institutions and entrepreneurs, and support groups, NGOs
	<b>Financing</b>	Project funds, municipal support
	<b>Necessary infrastructure</b>	internet, technical equipment (roundtable discussions), educational material

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**Description of practice**

<b>Short description/needs recognition</b>	When examining the disadvantaged settlements of Szabolcs-Szatmár-Bereg county, four critical areas were identified in the living conditions of the Roma population: education, employment, healthcare, housing.
<b>Realization</b>	It is the responsibility of the municipality, in response to local needs, to cooperate and continuously consult with municipal / business entrepreneurs, NGOs, institutions and citizens in order to implement the program. In an innovative way, the goal is to initiate a real dialogue, to identify innovative solutions, while encouraging the public to take action.
<b>Possible results, outcomes, future prospects</b>	improving communication between stakeholders, involvement of parents in school programs, mentoring (involving Roma mentors), setting up a computer training workshop, life guidance programs for Roma parents, information on training and professions, presentation of positive examples, scholarship scheme
<b>Possible problems and lessons learned</b>	Lack of expertise, lack of volunteering, and local problem as a local feature make it difficult to define generic solutions.



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**Why is it good practice?**

<b>Area-based approach</b>	The program takes the specific features of the region and its main challenges into account (aging, lack of expertise, high proportion of Roma people). Education is a critical point for disadvantaged people. In order to increase social well-being, short-term and long-term goals can be set during the program.
<b>A bottom-up approach</b>	The development of programs is preceded by various professional forums, roundtables (businesses - municipalities - disadvantaged people) and open days.
<b>Partnership approach</b>	organization of planning meetings with representatives of the municipality, the business sector, primary school leaders and the disadvantaged population (Roma) concerned.
<b>Innovation</b>	Socially innovative solutions based on real social dialogue and partnership have emerged, in which the partnership goes beyond the usual forms and engages in active brainstorming.
<b>Integrated approach</b>	The individual measures and development programs are closely related.
<b>Publicity / Networking</b>	Publication, website, roundtable discussions
<b>Sustainability</b>	The project responds to real needs, adjusts to needs, and cooperates with the municipality.
<b>Transferability</b>	Local factors, barriers and priorities can be identified as important factors. Framework conditions for improving living conditions at the local level will result in catching-up. The identification of stakeholders in the process, the role of communication (informing), the planning of financial resources, attempts to change attitudes and institutional background are all of particular import.

Table 1 Documentation principles of good practice

Source: own compilation

This solution could be an "applied team-based learning project which requires students to demonstrate their developed technical skills, their levels of professionalism, and their communication skills, as well as confront the many ethical challenges involved with this multifarious learning context" [23].

Within the program, sustainability would be supported if the pedagogical activity could be the part of their retraining course. Another task is that institutions of higher education should consider the workshop as a base for recruiting students, and the products made here could be sold.

The detailed documentation of the above presented solution has been completed, and in the future it can be recommended to settlements struggling with similar problems as "good practice". Comparing the results of testing with the help of the developed model, we can conclude that the social innovations implemented in the examined settlements in the recent period are compatible, i.e. our system is capable of generating new social innovations based on its knowledge base.

## 7. CONCLUSIONS

In order to improve the well-being of the community, social innovation gives new answers to the everyday problems of the certain community, and as a means to respond to challenges it results in a novel approach to handling regional disparities. In seed areas technical innovations mean solution for developing life quality, however, in disadvantaged peripheral regions it is necessary to take novel initiatives such as social innovations into account. Reducing regional disparities and enhancing regional competitiveness are important factors in the innovation efforts of settlements. In our opinion the starting point for examining social innovation is the precise formulation and answering of the questions that analyze the definition, its connection with technical innovation and the territorial characteristics. One of the possible ways of the conceptual clarification of social innovation is examining the implementation of good practices.

Modelling on the basis of neuro-fuzzy logic also determines further development opportunities. With the help of good



practices and expertise, proposals can be made that lead to professional advisory activity following a cost/benefit analysis.

We believe that value-driven social innovations integrating young people of all ages can be useful methodological solutions to community problems and contribute to reducing youth migration.

## 8. ACKNOWLEDGEMENT

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