

SOCIAL INNOVATION – SUSTAINABLE SOLUTION TO TACKLE ENERGY POVERTY IN URBAN AREA

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Abstract

Innovation is about “new ideas” and social innovation is any activity, law, software, internal procedure, which is implemented for bringing added value into specific area and without those actions, couldn't be possible to have better outcomes. A decision which is taken by the local authorities and it is improving the welfare it is also a social innovation. Often there is a confusion between “doing my job” and “social innovation”.

In public administration there is a real need for social innovation, any good project could be a real social innovation if it brings added value.

The paper presents a pilot project, with a target of 35-50 private houses selected in order to create a heterogeneous project with different type of buildings, from different geographic areas from District 1, from different years of construction, with a low level of income for each building, under 1000 euro/units. This last criterion has the roll to sustain and to tackle energy poverty.

In terms of novelty, this represents a new approach in Romania, through the project we intend to test and to develop the sustainable and efficient technical solutions.

Keywords: social innovation, environment protection, investments, CO2 emissions, renewable resources

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Introduction

Bucharest - Ilfov is one of the eight development regions of Romania, comprising the Bucharest Municipality (country capital) and Ilfov County. The network of settlements consists of 9 cities (only one municipality), 32 communes and 91 villages (Statistical Yearbook 2018, National Institute of Statistics). Bucharest government is headed by a general mayor; furthermore, the city is divided in 6 administrative units (districts), each one being governed by a local mayor. The economic environment of the region is particularly attractive due to the existing institutional structure, skilled labor force and developed communications system compared to other regions of the country. Bucharest Municipality and Ilfov County represent the region with the largest population in the south of the country and also with the highest degree of urbanization. Bucharest Municipality is the largest city of Romania divided in 6 districts. As Mândruț O. and Ardelean A. (2013) mention, this region is justified due to the large human and economical concentration, having almost the same number of inhabitants like the rest of the regions. As Popescu C. (2015) mention that in order to measure the local economy of a territory the following indicators can be used: economic structure, local advantages, human capital and institutions. In this matter, the location of the Pilot Project Proposal and the Investment Program is District 1 of Bucharest Municipality. District 1 of the Municipality of Bucharest has a population of 250000 inhabitants, of which about half live in multi-story residential buildings (in blocks of 4 to 10 floors) and the other

half live in individual private houses. District 1 is governed by elected local bodies, the Mayor being the highest representative of the district executive, while the district's deliberative authority is the Local Council.

1. Social innovation in public administration

Innovation is about “new ideas”, from our point of view, social innovation is any activity, law, software, internal procedure, which is implemented for bringing added value into specific area and without these actions, better outcomes would not be possible. A decision which is taken by the local authorities and is improving the welfare, also being a social innovation. Often there is a confusion between “doing my job” and “social innovation”. When a city hall's employee is doing their daily job properly, for a added value or for increasing the welfare, he considers that to be social innovation. A solution given by a colleague would be that the city all should have a social innovation in the public relations area with citizens' trough decreasing the waiting time for solving a request and for doing this the employees should not spend their time chatting on social media. We consider this is not a social innovation; it is just our daily job responsibility. In public administration there is a real need for social innovation, any good project could be a real social innovation if it brings added value. Lately it has been quite common for city hall employees are explaining why it's not possible to implement a project rather than trying to find solutions to do it. It is a daily challenge to motivate people to be responsible for their jobs and in the same time to implement new ideas. Also, we've noticed that any small change could be difficult to adjust to if it's not discussed with the employees which should implement it, they need to be deeply involved in the decision-making process.

For a sustainable development, the role of public institution is of a great importance. In a country as Romania, member of EU from 2007, investments made by the government and local governments are mandatory. In actual context, the challenges are greater than they were 15 years ago. Challenges as climate change, EU regulation, ageing, energy poverty, all these bear high pressure over the public institutions. In this context, District 1 of Municipality of Bucharest has begun to be the pioneer since 2009, when the Thermal Rehabilitation Program for multilevel buildings started to be implemented and between 2009 - 2019 more than 900 units have been rehabilitated, for more than 50000 apartments (District 1 Municipality of Bucharest, report 2019). After completing the Thermal Rehabilitation Program for the residential multilevel buildings, the District 1 has adopted the Strategy regarding a program for increasing energy performance in single-family dwellings. The program aims to fulfill a basic social need: the access of the population to electricity and heat in sustainable economic conditions. Although the investment is developed by District 1, a rich community, the program is part of policies to combat energy poverty in District 1, which is translated by the lack of supportability of the maintenance bill or access to modern forms of energy.

Today approximately 90000 inhabitants are living in private houses. From these, around 20000 inhabitants are living in areas which are eligible for thermal rehabilitation program, in accordance with the law (District 1 Municipality of Bucharest, report 2019). There are few conditions adopted through local strategy according to the law related with eligibility in the program. Is not possible to include in the program houses located in protected built areas, or in areas declared historical monuments, at the same time, in agreement with the strategy, only houses with the built area above ground by max 160 sq. (the equivalent of 135sq heated areas) will be considered. Having all this information with different constrains, the challenge is to find the best way to implement thermal rehabilitation for private houses under the conditions mentioned above.

2. Thermal Rehabilitation of private houses

European Commission (2014) defines social innovation as „new ideas that meet social needs, create social relationships and form new collaborations”, where the main objective is to ensure growth. In this matter, European Union is funding social innovation projects for member states through different programs.

In the next section we present a project for thermal rehabilitation of private houses from the 1st District from Bucharest, as social innovation in order to tackle energy poverty, concern that is pressing a lot of households from our country.

Selon C and Mair J. (2018) mention that “innovation therefore refers to a set of activities that creates unpredictable positive or negative outcomes sometime in the future”. The order to ensure an heterogeneous project we include 35-50 private houses with different type of buildings, from different geographic areas from District 1, from different years of construction, with a low level of income for each building, under 1000 euro/unit. This last criterion has the role to sustain and to tackle energy poverty and in terms of novelty, this is a new approach in Romania, because includes sustainable and efficient technical solutions. One difficulty in selecting the 35-50 private houses is given by the big number of the demands collected over the last years by the city hall office, being registered over 2100 demands from the citizens that ask express their intention in being part into a thermal rehabilitation. It is important to mention that 2100 does not represent the number of houses, but the number of simple requests, some of them being even doubled. From these 2100 approx. 67% are eligible according with the law, representing in a number of 1470 valid demands (District 1 Municipality of Bucharest, report 2019).

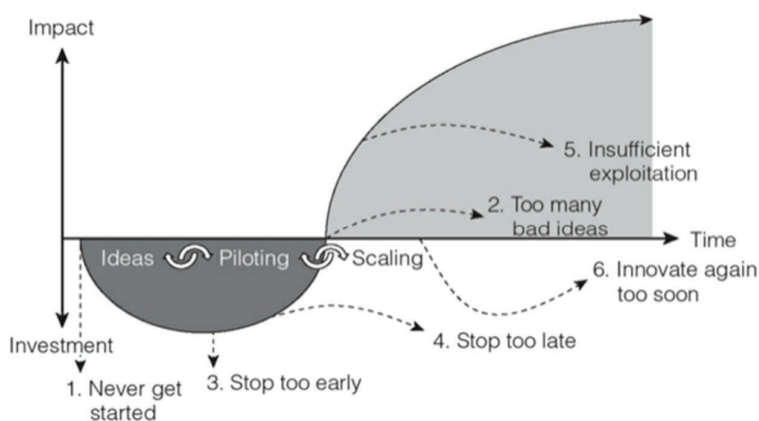


Figure 1. Main pathologies along the innovation process

Source: Seelos, Christian. Innovation and Scaling for Impact: How Effective Social Enterprises Do It (p. 45). Stanford University Press. Kindle Edition

As Seelos C. is presenting in the graph above, we identified three main phases of the project:

Phase 1: **Ideas**, this phase involves the creation. Communication is very difficult in this phase, because many internal barriers and limits could be met. Brainstorming meetings could

be developed technical solutions in order to identify legal constrains and to develop a methodology for future enrolments.

Phase 2: **Piloting** this phase focuses on experimenting, designing, adapting solutions.

Table 1. Distribution of the houses in the pilot project by heated area

Heated area			Total no of building
60-85 sqm	85-110sqm	110-135	
808	412	250	1470
55%	28%	17%	100%
Estimated distribution of houses in pilot			
27	14	9	50

Source: calculation of author based on data from District 1 Municipality of Bucharest

The beneficiaries from the Pilot Project will be citizens which are living in private houses from a total of 50 units, 27 lives in houses which have sizes between 60-85 sqm, 14 between 85-110 sqm and 9 houses between 100-135 sqm as heated areas. Also, the income for each household is under 1000 euro/month. In the selection of the houses we will use 8 criteria, as follows:

1. The house should not be in the protected areas defined from an architectural point of view, or in historical areas;
2. Only houses which have eligible technical expertise will be rehabilitated;
3. Only units which are in accordance with the law definition regarding private houses will be selected for the pilot; “Building with the purpose of dwelling, satisfying the living requirements of a person or family. It is assimilated to the single-family dwelling with the destination of the dwelling with the most two above-ground levels and two dwelling units, owned in the property of distinct physical relies, unconstituted in the reserve layer in the Association of Owners” – Government Emergency Ordinance no. 18/2009;
4. Land distribution – the houses will be selected from different geographic areas;
5. Construction materials – within project we have houses built from different materials;
6. Year of construction – we will select houses built between 1900- 1990;
7. The maximum size will be 160 sqm;
8. The income level for householder should be under 1000 euro/month as average for the entire pilot.

In terms of sustainability the pilot project is part of the policies that combat energy poverty in District 1, which translates in the lack of supportability of the maintenance bill or access to modern forms of energy. Having in view an important segment of the population which, due to their age in conjunction with the occupational status, does not pay the household expenses (water, gas, heat, energy) on a regular basis or on time, therefore investments towards increasing the energy comfort at the level of the house are difficult to be made directly by the population. The program consists of substantial investments in energy refurbishment in residential buildings, conducting to average total specific energy consumption (heating, hot water, light) after the execution of works of 179, 81 kWh/sq.m y, from 492.11 kWh/sqm/y before. Investments costs could be covered by the Municipality from its own resources, loans (to be attracted) or other legal funds. In order to estimate the costs involved, a sampling of 50 houses was analyzed at this stage and divided into three

intervals based on their heated area. Starting from the percentage of their distribution, the total was estimated as follows:

Total investment value, respectively the general estimate, includes three main cost categories: design and technical assistance, works and supervising. According to the Romanian legislation GEO 18/2019 the design phases are:

- Technical expertise, energy audit, documentation for authorizing interventions works (DALI)
- Technical documentation for building permits (DTAC)
- Technical design including execution details (PT+DE).

Also, according to GD 907/2016 the local coordinator must elaborate the technical-economic documentation including technical design. Costs corresponding to chapter Design and Technical Assistance according to the general estimate include in addition to the above, costs for organizing public procurements, consultancy, financial audit, technical assistance from the designer during the execution of works, supervising, while chapter Other costs includes inter alia publicity and site supervising.

Table 2. Estimated cost for project preparation (Euro)

No of buildings	Heated area/ no of houses			Total no VAT
	60-85 sqm / 27 units	85-110sqm/ 14 units	110-135/ 9 units	
Technical expertise for buildings (fully financed by 1 District)	6.825,00	4.032,00	2.952,00	13.809,00
Energy audits	5.940,00	3.514,00	2.574,00	12.028,00
Feasibility Study and Design	17.820,00	10.500,00	7.677,00	35.997,00
Procurements	0	0	0	0
Marketing	1.755,00	910,00	585,00	3.250,00
Total cost for project preparation	32.340,00	18.956,00	13.788,00	65.084,00

Source: calculation of author based on data from District 1 Municipality of Bucharest

Table 3. Estimated basic Investment cost (Euro)

No of buildings	Heated area/ no of houses			Total no VAT
	60-85 sqm / 27 units	85-110sqm/ 14 units	110-135/ 9 units	
Construction +montage+equipment	368.847,00	223.160,00	16.6914,00	75.8921,00
Technical assistance	5.940,00	3,080,00	1,980,00	11,000.00
Total cost for basic investment	374.787,00	226.240,00	16.8894,00	769.921,00

Source: calculation of author based on data from District 1 Municipality of Bucharest

Table 4. Total estimated cost I+II (Euro)

No of buildings	Heated area/ no of houses			Total no VAT	Total inclusiv VAT
	60-85 sqm/ 27 units	85-110sqm/ 14 units	110-135/ 9 units		
Total project preparation	32.340,00	18.956,00	13.788,00	65.084,00	77.449,96
Total cost for basic investment	368.847,00	223.160,00	166.914,00	758.921,00	903.115,99
Total	401.187,00	242.116,00	180.702,00	824.005,00	980.565,95

Source: calculation of author based on data from District 1 Municipality of Bucharest

The total cost (approx. 1.000.000 EUR) could be covered by the District 1 – Municipality of Bucharest according with a local committee decision or other national or EU funds. Phase 3 from the Figure 1 the Graph Innovation process is scaling.

Scaling past innovations should be the dominant activity of most organizations at any given time. Scaling is how we will create impact based on our investments in innovations. Before deciding to start the scaling process we consider that there are some possible traps which should be carefully analyzed:

- Decision for scaling too early when there is a lack of practical experience from the organization, insufficient prepared personnel, unprepared for the size of the project;
- Illusion of understanding and illusion of competence - when innovators are ignorant in the face of the necessity of scaling to create impact from innovation;
- Low visibility of the pilot, lack of evidence-based data communication can have a negative impact for the awareness of the project, especially when the project is financed with public funds;
- A weak leadership team can lead to an understaffed and under resourced scaling process;
- Using innovation as an opportunistic political decision can easily overwhelm the organization's scaling;
- Lack of reanalyzing the pilot project's phases (test, learn, adapt).

The **vision** for entire project is increasing the quality of life in urban areas through investments in environment protection. With sustainable and efficient solutions for

environment, combating energy poverty the District 1 could become the first Green Community in Bucharest. The proposal for scaling the pilot project is to Scaling through adding resources, like: hiring more staff, getting additional funds, increasing income and expanding the infrastructure. The main activities related to the programme include:

- Forming of the implementation unit;
- Identification and inventory of the buildings;
- Establishing the owners' registration methodology;
- Creating the communication strategy;
- Setup the energy efficiency measures and mechanisms for quantifying energy consumption according with data collection from the pilot project;
- Funding allocation and approving of technical-economic indicators for each building, represents the approval of investments program in the city local committee;
- Contracting and monitoring technical expertise, energy audit, technical project and execution details;
- Contracting and monitoring the execution of works up to the final reception of the buildings.

The overall proposed programme consists of substantial investments in energy refurbishment in residential buildings, conducting to an average total specific energy consumption (heating, hot water, light) after the execution of works of 179,81 kWh/sqm y, from 492.11 kWh/sqm y before.

The project will cover 3000 private houses, around 10,000 citizens and investments costs could be covered part by the Municipality from its own resources, loans (to be attracted), other legal funds and the owner's co - finance. These 3000 units will be divided into lots and refurbished in several stages, which will allow the developing of the learning curve and iteration throughout the process. Another important target that we have planned is to use the ELENA facilities (the grant proposed by IEB) for technical assistance. The target set considering ELENA is to award works contracts' covering approx. 3,000 buildings in the period 2020–2023. The time allocated to finalize the implementation phase for all buildings will be the latest in 2030. Necessary measures in order to achieve the ambitious goal of increasing energy performance by rehabilitating the existing housing stock in District 1 are:

- change of the existing carpentry for one with energetic performance, high degree of tightness and with increased thermal resistance (changing of doors and exterior windows with carpentry characterized by $U'=1,30 \text{ W/m}^2\text{K}$ ($R'=0,77 \text{ m}^2\text{K/W}$);
- thermal rehabilitation works of the building envelope elements (external walls up to $U'=0,52 \text{ W/m}^2\text{K}$ ($R'=1.80 \text{ m}^2\text{K/W}$);
- insulation of the floor under the bridge or of the roof terrace (up to $U'=0,18 \text{ W/m}^2\text{K}$ ($R'=5.00 \text{ m}^2\text{K/W}$);
- installation of electric solar panels for the production of energy from renewable sources (photovoltaic panels);

In order to estimate the costs involved, after the sampling of 50 houses we have extended the data (for the ELENA application) and divided it into three intervals based on their heated area. Starting from the percentage of their distribution in the total, the distribution of 2,999 buildings was estimated as follows:

Table 5. Distribution of houses included in the ELENA program

Heated area			Total no of building
60-85 sqm	85-110sqm	110-135	
808	412	250	1470 initially request
55%	28%	17%	100%
Estimated distribution of houses included in the ELENA program			
1636	840	523	2999

Source: calculation of author based on data from District 1 Municipality of Bucharest

Total investment value, respectively the general estimate, includes three main cost categories: design and technical assistance, works and supervising. According to the Romanian legislation GEO 18/2019 the design phases are: Technical expertise, energy audit, documentation for authorizing interventions works (DALI); Technical documentation for building permit (DTAC); Technical design including execution details (PT+DE). Also, according to GD 907/2016 the local coordinator must elaborate the technical-economic documentation including technical design. Costs corresponding to chapter Design and Technical Assistance according to the general estimate include, in addition to the above, costs for organizing public procurements, consultancy, financial audit, technical assistance from the designer during the execution of works, supervising, while chapter Other costs include inter alia publicity and site supervising. Although a part of these costs are eligible under Elena as cost before the investment, we cannot exclude them from the total investment cost according to the general estimate. We can only make a difference between the basic investment cost and the other costs up to the sum of the total.

Therefore, we consider the following split:

Table 6. Cost for the project preparation (mil.Euro)

No of buildings	1636	840	523	Total without VAT	Total VAT included
Technical expertise for buildings (fully financed by 1 st District)	0.41	0.24	0.17	0.83	0.98
Project Development Services eligible under ELENA	1.67	0.97	0.69	3.33	3.92
Total costs for project preparation	2.08	1.22	0.86	4.16	4.91

Source: data above are collected from District 1 ELENA's application

Table 7. Basic Investment costs (mil.Euro)

No of buildings	1636	840	523	Total without VAT	Total VAT included
Construction + montage + equipment	22.35	13.39	9.70	45.43	54.07

Technical assistance during the implementation of works (including site supervising)	0.78	0.47	0.34	1.59	1.89
Total costs for basic investment	23.13	13.86	10.04	47.02	55.96

Source: data above are collected from District I ELENA's application

Table 8. Total costs (mil.Euro)

No of buildings	1636	840	523	Total without VAT	Total VAT included
Total cost	25.21	15.07	10.90	51.18	60.86

Source: data above are collected from District I ELENA's application

Table 9. Estimated PDS costs (kEuro)

PDS Activity	Cost VAT included
Project management	235
Tenders process	71,40
Feasibility studies	2558,50
Energy audits	856,80
Technical studies	0
Financial engineering	23,80
Marketing	59,50
Stakeholders and community(ies) engagement	116,62

Source: data above are collected from District I ELENA's application

We can observe the average total cost (III) per building is of EUR 20,295 VAT included (Including technical expertise, PDS, works and site supervision). The basic investment program cost (II) per building of EUR 18,659 VAT included (with works and supervision).

Table 10. Outcomes in the period 2020-2030

Number of Houses	3000 units
Decreasing of energy consume	-35-40%
Increasing value of the house	15%-20%
Combat energy poverty	1500-2000 families with low incomes
Social Equity	Between citizens from the multilevel dwellings and single houses.

Source: calculation of author based on data from District I Municipality of Bucharest

Social innovation represents a driver for change and for improving the quality of life. The outcomes for the period 2020-2030 through the pilot project present a decrease of the energy consume with almost 40%, an increase in the value of the houses with almost 20%. One of the objectives of European Union strategies is to combat the energy poverty having effects on different policies. The project is combating energy poverty and assuring social equity in

urban area by supporting between 1500 – 2000 families with low incomes living in single dwellings.

Table 11. Impact 2020-2030

Impact	Results	Unit
Energy savings	83.52	[Gwh/y]
Renewable energy sources	11.16	[Gwh/y]
Avoided CO2 emissions	21.130	[t CO2eq/y]

Source: calculation of author based on data from District 1 Municipality of Bucharest

Conclusions

The ambiguity around the term innovation is a strong barrier to learning and knowledge accumulation and making productive decisions. The rules and internal procedures, many times represent a barrier for creativity. The old experience and approaches are also milestones in developing new ideas, we systematically overestimate our abilities in many areas of life and especially in the professional one, “we know better”. Dealing with innovation involves dealing with uncertainty and in the public system there is a fear for failure and innovation is considered more probable to fail rather than succeed. But with all this constrains we consider that innovation is possible in a public institution if a proper framework is created. One idea is to move the source of ideas from the smoking corner into another place, more comfortable room where people can debate and express around the table their ideas. We can encourage the public servants to increase their creative confidence and vision, to overcome the fear. The small project, the best practice models should be spread and discussed with colleagues. Students can be a valuable asset; they can be involved as volunteers in the projects, also taking part at different events and conferences, which could provide useful knowledge and a new mindset.

The region Bucharest-Ilfov is the most developed region from Romania, taking into account the GDP/capita as main indicator, but is still facing a lot of weakness compared with other regions from European Union. The main weakness are: high bills for heating, hot waters and lighting; high CO2 emissions; low market value of the houses; poor urban landscape; low quality of life; social inequity; degradation of welfare. Energy poverty represents one of the major problems and is estimated that more than 50 million household are facing this type of poverty in European Union (European Commission, 2019).

As awareness for energy poverty is growing, European Union makes efforts to tackle energy poverty; European Union is financing social innovation projects through different programs. As well, European member states are financing from national funds this type of project. In this matter, we developed a pilot project, representing social innovation for local authorities from the urban area, respectively from the 1st District of Bucharest Municipality. The project will have three main interventions with direct outcome, as follows:

- A. To reduce the bills for heating – we will identify the proper measures, technical measures for isolations of the external walls and low- e windows (changing of doors and exterior windows with carpentry with energetic performance);
- B. To reduce CO2 emissions, low level of primary energy will conduct to low level CO2 emissions;
- C. Implementing the renewable resources – we want to test and implement photovoltaic panels for electrical energy maximum 3kw/ house.

The pilot project is an experimental one in order to test the best solutions to learn during the implementation process and to adapt it for scaling. With the experimental project we need to identify a few technical interventions, to reach our assumed outcome (see A, B, C). The next step will be to measure the results and determine the impact of the policy interventions and, in the last phase, to adapt the policy intervention for scaling process to continually improve of our understanding of what works. As complementary outcomes, we consider that this intervention will increase the market value of the houses and the quality of life, the urban aspect will change - having pleasant colors overall gaining a greater overall pleasant appearance and we will have social equity between citizens from the multilevel dwellings and single houses.

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