FINANCING METHODS FOR INNOVATIVE START-UPS IN THE DOMAIN OF NONCONVENTIONAL ENERGIES

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ABSTRACT: Among the investments with the most impact on the society, there are the firms working in the nonconventional energies domain. However exciting this domain is, starting up such a firm is not an easy task. The innovation can be supported out of public subscriptions or through specific financing programmes. This article refers to a start-up in the field of renewable energy (producing wood pellets and briquettes) and its appliance for a EU grant for innovative start-ups. There are discussed the methods of financing, the firm, the project (mainly its objectives and activities), a market analysis and the expected innovative output. Also, there are discussed the rules to be followed when writing a project for accessing innovation grants.
KEYWORDS: green energy, wood pellets and briquettes, financing methods, start-up, innovation

1. INTRODUCTION

While the nature of economic competition has been undergoing huge changes during the last century, innovation has become the primary source of productivity growth. The option to create wealth from the valorisation of academic research raised new entrepreneurial strategies. These strategies and policies exist at the European level, but have also been adapted for national and regional levels, regulating and promoting innovation in economy and are implemented through Structural Funds and the Cohesion Fund. [1]

The actual generation of cohesion policy programmes (operating in the period 2014-2010) request that the accession of structural funds through European Regional Development Fund (ERDF) for investments in research, development and innovation should be made based on a smart specialisation strategy. [2]

In the framework of innovation, the main objectives undertaken by the Romanian organisation National Authority for Scientific Research and Innovation (NASRI - ANCSI) are [3]: increasing private research and innovation development; supporting research and innovation infrastructure and capacity to develop excellence centres; promoting an innovation friendly environment for business.

According to the Global Competitiveness Index 2015-2016 [4], Romania ranks 75th out of 144 economies for innovation (with an overall index of 53). For 2014-2015 [5], Romania held the rank 59 out of 144 (specifically, the innovation held the rank 66).

But innovation, like almost every human activity requires more or less energy resources. Of course, there is the case in which innovation refers to energy resources, a situation that is nowadays most encouraged.

The world's available energy sources could be divided in fossil fuel (coal, oil and gas), nuclear fuel and renewable resources. While the fossil and nuclear fuel are somewhat limited and have negative impact on the environment, the renewable energy resources are the key to a sustainable development. [6]

Renewable sources of energy include [7]: solar energy, wind energy, tidal and hydro power, biogas, modern biomass, geothermal energy. Converting them into energy require the usage of nonconventional technologies. While the attribute "renewable" implies that one specific resource is available on a permanent basis, the efficiency of its transformation into energy is still a challenge.

Technological innovation and development is important and it is described as a linear process, from basic research, to applied research, to development, to commercialization, to diffusion, and to the consequences of the innovation. Academic institutions and public research agencies have long been associated with the growth of high technology companies and industries. [8]

Thus it is justified the existence of organizations like incubators, technology transfer offices, commercialization units, entrepreneurship centres, spin-offs and start-ups. In addition to the creation of

new jobs, these innovative companies are the engine of economic growth.

2. METHODS OF FINANCING

2.1 Financing methods

Currently, there are several financing instruments for the innovative start-ups.

According to Business News Daily [9], many aspiring entrepreneurs have a business idea, but they lack financing. The editors identified no less than 14 methods a potential entrepreneur could use to finance his ideas, which include (online) lending, product presales, side businesses, selling assets, venture capitalists, winning a contest, crow-funding, grants.

In Romania, the grants for start-ups and spin-offs are awarded by EU, through national programmes. According to the Government Ordinance no. 3823/2015, Art. 6, the Ministry of Education and Scientific Research a defines a start-up as "a new company having maximum 3 years that is implementing a research result".

The program "Innovative enterprises in the category of start-ups and spin-offs" refers to EU grants up to a limit of 200.000 EUR, the own contribution being of 10% of the value of the grant. The main objective of the program is to assist the development of new or significantly improved products, technologies / processes and / or services. [10]

The eligible applicants should be start-ups (enterprises with maximum 3 years of activity) or spin-offs (enterprises that are to be set up). Also, the eligible applicants should possess a result, such as a patent, patent application, the PhD thesis of the project manager (which should be employee of the enterprise), or the intellectual usage rights of some research results applicable to the project.

The financing schemes "Financing RDI projects as per the Program Development of National R&D System", "Financing RDI projects as per the Program Increasing the Competitiveness of Romanian Economy through Research, Development and Innovation" and "Financing RDI projects as per the Program European and International Cooperation" offer grants of the Romanian Government up to 20 mil. EUR for industrial research (with 50% own contribution), 15 mil. EUR for experimental development (with 75% own contribution) and 7.5 mil. EUR for innovation. [10]

Eligible applicants for these schemes are enterprises which perform R&D, universities, NGO performing R&D, R&D institutions. Among the eligible activities, there are fundamental research, industrial research, experimental development, feasibility studies, activities for innovation.

2.2 Innovative projects: from idea to implementation

Every innovation starts with an idea. In order to put the idea into practice, one must follow the logical sequence of stages which define the development of a project: initiate, plan, formulate, implement and evaluate.

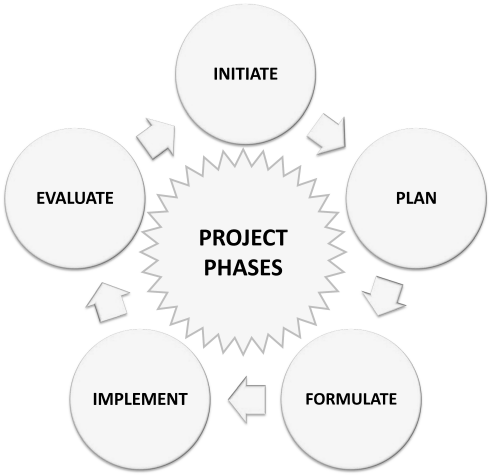

Figure 1. Phases of a project

One initiate a project with the idea to be put in practice and a list of available financing schemes. The planning phase should lead an entrepreneur to achieve a logical succession of activities in order to put the idea in practice. An appropriate financing scheme should be chosen and its Applicant Guide, as well as the eligibility conditions should be read.

The formulation phase involves the filling in of the Application Form and its annexes (budget, financial projections, business plan and so on) and submitting it as requested in the Application Call.

The implementation of a project starts with the signing of a contract between the applicant and the grant-awarding authority. The contract is written based on the Application Form and its annexes. The activities undertaken must follow the activities described in the contract and respect the assumed deadlines. In addition of the implementation period, a sustainability period is defined, in which the results of the implementation are observed.

The evaluation of a project consists in auditing activities at the end of the implementation project. Also, reports during and at the end of the sustainability period are a evaluation tool for the project.

3. CASE STUDY: SC ANDREI SLAVICI SRL

3.1 The start-up company

SC ANDREI SLAVICI SRL is a private microenterprise founded in 2012. The company is a spin-out of the Ioan Slavici Foundation for Culture and Education with the purpose of commercial valorisation of the scientific research results and has the NACE code 1629 (Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials). This specific NACE code allows the company to produce fire logs (briquettes) and fire pellets out of pressed wood or substitute materials. Since 2015, the company is an associate in the Cluster for Environment and Renewable Energy Sources WESTTIM (MERWT), which also includes, among its 17 associates, INCEMC - The National Institute of Research in Electrochemistry and Condensate Materials, Ioan Slavici Foundation for Culture and Education, Ioan Slavici Highschool.

Currently, among the assets of the company there is a production line for pellets and briquettes.

One of the objectives of the company is to use innovation in producing fire pellets and briquettes with a higher energetic efficiency and thus to address the growing market of nonconventional solid bio-fuel.

As the company was an eligible start-up, we applied for a grant through the program "Innovative enterprises in the category of start-ups and spin-offs".

3.2 The project - objectives and activities

Te project was named "Innovations in industrial production of energy materials. Computer-aided optimizations at economic and functional levels".

The main objective of the company, i.e. using innovation to address to growing market of nonconventional solid bio-fuel, led to the following objectives of the project:

O1. The innovation of the production line using specific elements, yielding to specific optimized manufacturing technologies for pallets and briquettes;

O2. The optimization of different types of manufacturing recipes for pallets and briquettes using scientific planning for industrial research, yielding to specific technologies and innovative energetic measures;

O3. Market penetration and achievement of a certain market share for the products, by properly interpreting the needs analysis, needs assessment and supply and demand analysis.

O4. Recycling forestry residues and waste from the wastewater treatment plants yielding to social benefit;

O5. Obtaining scientific and technological results concerning renewable natural resources and the manufacturing process of pallets and briquettes, yielding to knowledge and databases and neural network forecasting.

The project is based on the PhD thesis in the field of industrial engineering of the project manager, ing. Liviu Herman, PhD. The thesis, with the title "The optimization of the technological systems for using the renewable sources of energies for heating up a building", was held at Politehnica University, in 2012. From the thesis of dr. Herman, the following results were to be valorised:

- The mathematical models from the thesis were to be adjusted according to the industrial research performed, implemented and verified in practice.

- To the renewable energetic materials proposed in the PhD thesis, new materials were to be added and studied, such as: sludge from wastewater, forestry and agricultural waste, new energetic plants (sorghum).

- All the databases created in the Herman' thesis were to be further developed and embedded in new knowledge databases with usage both at the level of finite product and geographic level.

- The production were to be extended from solid bio-fuels to include also animal feeding and soil fertilization products.

In order to fulfil the objectives, the following 10 major activities (packages of activities) should be undertaken:

A1. Research-development activities (industrial research and/or experimental development consisting in prototyping for pilot installation, the fabrication of pallets and briquettes, a dynamic system of knowhow).

A2. Procurement activities for research-development services

A3. Procurement of consulting services for research and innovation (quality tests for the pallets and briquettes and elaborating a patent request).

A4. Procurement of support activities for research and innovation services (quality tests for the pallets and briquettes in the laboratories and a case study on potential clients).

A5. Activities for introduction to production (fabrication and commercialization of the first series of the products).

A6. Activities of procurement of raw materials necessary for the project implementation for research-development activities.

A7. Activities of procurement of raw materials necessary for the project implementation for introduction to production activities.

A8. Visibility and dissemination activities.

A9. Project management.

A10. Final audit of the project.

3.3 Expected results

The project is expected to last 2 years. The expected results of this project are:

- until the 6th month of implementation: 2 prototypes for the production lines, 1 methodology for the research, 2 research schemes and their costs, samples of products, 2 internal reports, 1 external report (scientific article);

- until the 12th month of implementation: quality analysis on the samples of products, preparation for the production, at least 12 manufacturing recipes, 1 model for the production, 1 software, 2 internal reports, 2 external reports (scientific articles);

- until the 18th month of implementation: construction of a knowledge database, production and commercialization of the first series of pellets and briquettes, 1 market research for identifying potential new clients, revision of the technical documentation, participation at expositions and fairs in the domain of renewable energy;

- until the 24th month of implementation: production and commercialization of pellets and briquettes, realization of a prefeasibility study regarding the opportunity of a renewable energy park in the area, participation at expositions and fairs in the domain of renewable energy, filling a patent request.

3.4 Financing methods

The total value of the project is 1064438,50 lei, out of which:

- ineligible expenditures 143476,0 lei

- eligible expenditures 920962,50 lei, out of which 828866,25 lei represents the grant and 92096,25 lei represents the own contribution

An eligibility condition imposed in the Applicant Guide for this particular financing scheme was that the RDI-related expenditures must cover at least 30% of the total eligible expenditures and the expenditures concerning the introduction of the research results in production must cover at least 40% of the total eligible expenditures.

In the case of this particular project, the RDI-related expenditures are 32,03% of the total eligible expenditures and the expenditures concerning the introduction of the research results in production are 43,95% of the total eligible expenditures.

A Gantt diagram detailing the time span for the project activities as well as the resources allocated for them (both wages and procurements) is presented in Figure 1.

Activity	Year 1												Year 2												Financial resources (lei)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Procurements	Wages	TOTAL
A1. Research-development activities.																									1000,00	29807,06	30807,06
A2. Procurement activities for research-development services																									6000,00	692,31	6692,31
A3. Procurement of consulting services for research and innovation.																									11900,00	11840,24	23740,24
A4. Procurement of support activities for research and innovation services.																									11000,00	6152,22	17152,22
A5. Activities for introduction to production.																									18000,00	63820,67	81820,67
A6. Activities of procurement of raw materials necessary for the project implementation for research- development activities.																									91000,00	11583,17	102583,17
A7. Activities of procurement of raw materials necessary for the project implementation for introduction to production activities.																									134000,00	29533,20	163533,20
A8. Visibility and dissemination activities.																									24500,00	62571,14	87071,14
A9. Project management.																									10000,00	0,00	10000,00
10. Final audit of the project.																									5000,00	0,00	5000,00

Figure 2. Gantt diagram for the activities and resources allocated

4. DISCUSSION

4.1 Market analysis

According to a need analysis performed by the company, the potential market for the products consists mainly of individuals or companies, thermal energy consumers, from both urban and rural zones in Western Romania. In addition, another part of the market consists in individuals or companies using pallet-feeding for animals.

According to the need analysis performed by the company in the Western Romania, the potential clients are among:

- the 82,50% of the rural residences and 48% of the urban residences that produce the hot water in their own household (comparatively with 1,03% of rural residences and 41,80% of the urban residences which receive hot water from the public network)

- the 49,50% of the urban residences and 95% of the rural residences that have their own heating system. Out of them, 47% in the rural areas and 2,90% in the urban areas use solid fuels for heating.

Thus, the trend of the potential market for renewable energy materials and solid bio-fuels is growing.

The potential clients are households and industrial agents (micro energy centrals, factories, greenhouses), but also commercial spaces, schools, kindergartens, administrative offices.

The marketing strategy proposed in the project is focusing on a small distribution chain, with direct sell, presentations at fairs, online marketing.

4.2 Risks

We identified the following potential risks:

The financial risk, due to cash shortages at key-moments, is counteracted by the good financial situation of the company.

The human risk, due to a low performance of the employees is counteracted by the good management of the project in general and of the human resources in particular.

The market risk could be counteracted by using an appropriate marketing strategy.

The marketing risk could be counteracted by applying correctly the results of the market analysis in the market strategy.

The legal and administrative risks are counteracted by applying the measures contained in the existing risk management plans.

The maintenance risk can be counteracted by a good maintenance of the machines and the qualifying and training of the workers.

4.3 Sustainability

Institutional sustainability of the project is granted by the NACE code of the company, human and material resources and the company membership in a research cluster (MERWT).

The operational sustainability is granted by new jobs created through the project, in emerging sectors of the economy. The new jobs refer to research positions as well as trained workers.

The transferability of the project relies on good practices exchanges with other firms, participation at expositions and fairs and dissemination articles.

The mainstreaming will be ensured as the scientific results obtained through research will be included in the industrial production of the company and her partners.

At last, the financial sustainability is ensured both on short and long term. On long term (5 years after the end date of the project) it is estimated that the financial indicators internal rate of return (IRR) and net present value (NPV) will be 11,37%, respectively 77587 lei.

Thus, the sustainability of the project is ensured at all levels.

5. CONCLUSIONS

The continuous demand for new energy resources drives forward the quest for producing new, nonconventional sources of energy. In Europe and Romania, new firms in the domain of renewable energies are encouraged toward RDI, through grants of the European Union.

An eligible application should refer to a start-up in the domain of energy or another smart specialization domain, as defined by the NASRI, holding the intellectual usage rights of some research results applicable to the project. There are rules concerning the share of the total eligible expenditures to be related to RDI expenditures and innovative production expenditures. Additionally, the startup must perform R&D through the project, and should prove its sustainability.

Thus, through financing of startups in the domain of nonconventional energies, the innovation is stimulated in a field of most importance for sustainable development of the industry.

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