SWOT Analysis of NMS Participation in Euratom Projects

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ABSTRACT

Project NEWLANCER is one of the EURATOM FP7 projects with the objective to enhance the participation of new member states (NMS) in EURATOM programs. Analysis of strengths, weaknesses, opportunities and treats (SWOT) regarding the participation of NMS in EURATOM projects was performed, factors regarded as being important for the involvement in EURATOM training and research programs were evaluated and strategies for overcoming the deficiencies were proposed.

SWOT analysis was performed with the aim to provide relevant information for development of national strategies and policies to increase the participation in EURATOM programs. It was performed by national expert groups according to a common methodology, and for a specific field of interest: nuclear safety, new reactor generations, radiation protection, radioactive waste management and education and training. Altogether 18 SWOT reports were prepared in six NMS: Bulgaria, Hungary, Lithuania, Poland, Romania and Slovenia.

The results of SWOT analyses provided an insight into national perspectives and revealed some common aspects in all participating NMS and in all fields of interest:

1. The ability to participate in EURATOM research projects is severely influenced by the insufficient number of good experts in NMS. The human resources are even decreasing due to retirement and insufficient interest of young and talented students for nuclear field.

2. The risk of sustaining the available budget for nuclear research in the future is great. Investment in the nuclear technology field is appreciated as important factor for promotion of participation in EURATOM programs. Some countries have current investments in nuclear research and technology, and also some kind of stable funding provided by special funds.

3. Most important weaknesses/threats described are the lack of systematic planning on institutional and national level and bad management in research institutions. They substantially reduce the competitiveness of institutions and research groups from NMS in EURATOM tender.
4. Topics of EURATOM tenders are often different from the interests and needs of NMS. NMS with small nuclear program could manage to participate if they were able to participate in smaller projects.

Participating countries recognized their opportunities and proposed strategies to reduce weaknesses in order to be able to fully implement their opportunities. Participation in EURATOM projects was recognized as an important factor in reducing the weaknesses.

1 INTRODUCTION

SWOT analysis is a management tool used in strategic planning and supports focusing on key issues which define the performance. Results of SWOT analysis identify strong and weak aspects which impact the functioning of the organization or the project and serve as a background for strategy planning. It can be performed either for the organization or for a distinct project with the objective to provide the background data on the respective entity and The final objective of SWOT analysis is to support strategic decision making and to point out the internal factors that could be helpful in improving the capabilities of organization or the project to achieve its goals. Results of SWOT analysis also indicate which factors are important for achieving the objectives of the organization or the project [1].

SWOT analysis is based on subjective assessment of the importance four clusters of factors (Table 1). The most important issue is to distinguish between the internal and external factors. It gives more objective results if performed in group and if the relevance of the factors is defined by consensus and not by compromise. SWOT analysis can give different results in different contexts because factors are always defined according to the presented goals of the project.

Table 1: Clusters of factors checked in SWOT analysis.

![SWOT Analysis Diagram]

Defining strengths, weaknesses, opportunities and threats gives an input for further improvement of the performance of organization or project and provides the means for improvement. Different strategies that modify strengths, weaknesses, opportunities and threats can be applied in order to achieve better results:

1. Matching the positive or desirable factors to increase their effects,
2. Converting the negative or undesirable factors to positive or desirable factors,
3. Minimizing the negative or undesirable factors that can’t be converted.
2 SWOT ANALYSIS IN NEWLANCER PROJECT

NEWLANCER is a two years project started in 2011 in the FP7 EURATOM. Beneficiaries form new member states have been awarded only about 5% of the total EURATOM budget of FP6 and FP7 and the aim of NEWLANCER is to produce guidelines for enhancing participation of institutions from new member states in future EURATOM programs.

Ten research, academic and implementing organizations from six new member states participated in SWOT analysis in NEWLANCER project. They provided relevant information for policy development to increase the participation of the new member states in EURATOM programs on the following key thematic areas: generation III and IV systems and materials for fast nuclear reactors and ADS, nuclear safety, radioprotection, radioactive waste management and waste disposal, and education and training (Table 2).

Table 2: NEWLANCER participants from EU new member states and thematic areas of their interest.

| Generation III/IV Systems, Advanced Materials | Bulgaria (TUS) | Hungary (AEKI), Poland (INCT) | Romania (INR) |
| Nuclear Safety | Bulgaria (INRNE) | Hungary (AEKI) | Romania (INR), Slovenia (JSI) |
| Radioactive Waste | Lithuania (LEI) | Poland (INCT) | Romania (INR), Slovenia (ARAO, REC) |
| Radioprotection | Poland (INCT) | Romanian (INR) |
| Education and Training | Bulgaria (TUS) | Poland (INCT) | Romania (UPB), Slovenia (UL) |

INRNE Institute for Nuclear Research and Nuclear Energy of Bulgarian Academy of Sciences
TUS Technical University of Sofia
AEKI Atomic Energy Research Institute at Centre for Energy Research at the Hungarian Academy of Sciences
LEI Lithuanian Energy institute
INCT Institute of Nuclear Chemistry and Technology
INR Institute for Nuclear Research
UPB University Politehnica of Bucharest
ARAO Agency for Radwaste Management
JSI Jožef Stefan Institute
UL University of Ljubljana, Faculty of Mathematics and Physics
REC Regional Environmental Centre for East and Central Europe, Country Office Slovenia

SWOT analysis was performed as a part of work package dealing with analysing of skills and current participation of new member states in EURATOM projects. The relevant internal and external factors were defined by national member groups on the basis of their experience and deliverable D-NPOWER 1.1 [2]. Each new member state evaluated the importance of SWOT factors for respective topics relevant for their country. Each partner proposed the priority strategy that could encourage its participation in future EURATOM projects for each analysed topic. National results were integrated, common issues we extracted and presented in NEWLANCER deliverable D-NPOWER 1.2 [3].
3 METHODOLOGY OF SWOT ANALYSIS

An extended SWOT analysis was performed in order to reveal as many relevant factors in different national contexts as possible. The methodology included also situational analysis implementing SWOT confrontation matrix and CSF (critical success factors) analysis [4]. The analysis was divided into four steps:

- description of the situation,
- definition of objectives,
- definition of internal and external factors,
- generation of strategies.

The methodology was explained to the participants at the project meeting and templates for the report were distributed in order to ensure a unified approach.

3.1 Description of the situation

Descriptions of the national situations regarding participation of national institutions in EURATOM programs were prepared by leaders of national expert groups and discussed at workshops or brainstorming meetings. Information obtained by direct communication by phone or e-mail and information from NEWLANCER deliverable [2] were also used.

Final national reports shortly described the economic, political, cultural, legal and technological aspects of the research environment in respective countries and for respective topics of interest. The reports summarized the scope of participation in EURATOM FP 6 and FP7, the stakeholders of participation in EURATOM FP6 and FP7, national policy and institutional policies, resources, obstacles to participation, participation in other R&D programmes etc.

National reports presented evaluation of the importance of the issues described and pointed out the most important and influencing ones. Eventual disagreement about the importance of certain issues was notified.

3.2 Definition of objectives

National and institutional objectives of participation in EURATOM FP6 and FP7 were discussed during national expert group meetings. Particular care has been taken not to confuse the objectives of NEWLANCER project – increasing participation of new member states – with the national and institutional objectives of participation in EURATOM.

3.3 Definition of internal and external factors

External and internal S-W-O-T factors were defined in brainstorming sessions by each thematic group in participating countries. Group discussion helped to provide specific factors and to avoid general or unspecified factors. National or institutional objectives were presented to the brainstorming group before it started to collect the ideas for S-W-O-T factors. The group was encouraged to find at least two or three critical success factors for achieving these objectives.

Strengths, weaknesses, opportunities and threats were proposed by brainstorming and with the help of checklists (Table 3). The most relevant factors were put in basic SWOT matrix and SWOT confrontation matrix. Feasible strategies were derived by combination of some factors to, and to convert weaknesses to strengths or threats to opportunities were found.
Table 3: Checklist for defining relevant internal and external factors in SWOT analysis for evaluation of participation of new member states in EURATOM projects.

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<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>Issues that can be achieved and controlled by the institution. Core capabilities, competences or resources of the institution giving an advantage, issues that are valued by stakeholders.</td>
<td>What are the advantages in terms of human resources, technological resources, financial resources, expertise, management and organization, working in international environment, cooperation in national environment, reputation? What activities can be performed well? What are the experiences with participation in EU projects?</td>
</tr>
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<table>
<thead>
<tr>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>Issues that can be controlled and improved by the institution. Core capabilities, competences or resources of the institution where other institutions have an advantage, issues that are valued by customers.</td>
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<tr>
<th>Opportunities</th>
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<tr>
<td>Issues that can't be controlled by the institution. Conditions in the environments (e.g. social, scientific, technological) that can be an advantage for the institution.</td>
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<tr>
<th>Threats</th>
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<tr>
<td>Issues that can't be controlled by the institution. Conditions in the environment that have the potential to prevent successful performance, and it is best to avoid them if possible.</td>
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4 RESULTS OF SWOT ANALYSIS

SWOT analysis was performed by 18 national expert groups participating in the project and for specific thematic areas in six new member states (Bulgaria, Hungary, Lithuania, Romania, Poland, Slovenia). It showed similar pattern in all countries but some differences for respective thematic areas.

Prevailing objectives and motives for participation in EURATOM programs in all countries were knowledge preservation, exchange and upgrade, access to research infrastructure, additional financial resources for education, training, research and development
and opportunities for networking. Participation in EURATOM projects was also understood as a good way to influence national policy making and to improve education, training and career development of personnel in the nuclear sector. Impact on development of human resources in new member states was noted, mainly through providing access to training courses and expert visits and possibilities for participation in projects which could not be done by new member states alone, due to their lack of human, technical and financial resources.

4.1 Description of situation and objectives

The analysis showed some minor differences in the respective thematic areas, however all countries stressed similar issues:

1. **Generation III&IV and Materials**: Main objectives in all countries were access to knowledge and practice, information exchange and training of experts. Access to specialised research infrastructure, opportunities to work with good research equipment and increasing mobility of researchers as well as opportunity for additional funding were also noted as important issues. The main success factor that was recognized in all SWOT analyses was to clearly define research policy and strategy for nuclear technology on national and institutional level. The proposed strategies for improving new member states participation in EURATOM programs emphasized the importance of strategic planning in order to take advantage of strengths and opportunities. Countries with small nuclear programs require the possibility to participate in smaller projects or programs. Strategy of increasing investments in nuclear field and of joint application for projects was also mentioned.

2. **Nuclear safety**: Main objectives were access to knowledge and practice, information exchange and training of experts and young scientists, opportunity for additional funding and access to research infrastructure. Networking and possibility to influence the national nuclear safety policy were specific important aspects for this thematic field. Strategies leading to realisation of success factors emphasize the role of national policy and strategy making, defined short- and long-term research programs in the institutions and sufficient funding. Preferred strategies use and develop existing strengths and opportunities while weaknesses and threats are not considered to be manageable.

3. **Radiation protection**: Main objectives were development and exchange of knowledge, training opportunities for experts, financial resources and opportunity for networking and implementing projects that could not be done without international collaboration. In addition to defined policy and strategy that was declared as an important success factor, establishing of supporting organisation for giving support to industry and government in radiation protection issues was mentioned. Different strategies for achieving objectives were proposed. Strategy of using strengths and opportunities was recognized as very suitable but improving management in order to reduce weaknesses and stimulation of application for EU projects in order to increase the opportunity was proposed.

4. **Radioactive waste management and disposal**: Main objectives of this issue in participating countries were the upgrade and exchange of knowledge and experience, increase of the visibility of institutions and experts from new member states, opportunity for additional financial support, harmonization of national policy with EU policy, synchronization with EU research, access to experimental infrastructure and contacts with experts. The following critical success factors have a key role for achieving these objectives: defined national policy and strategy and appropriate national legislation, cooperation of all activity holders in the field on national and international level, and investments in waste management and research infrastructure. Strategy of
using strengths in order to increase opportunities for participation in EURATOM framework programs was proposed. Weaknesses can also be managed by enhancement of cooperation with other research institutions and increased participation in international projects.

5. **Education and training:** Objectives in the field of education and training are a little bit different from the objectives in other fields. Main interest is focused on exchange of students, researchers and academic staff in order to preserve and upgrade the knowledge. Participation in EURATOM projects is aimed to development of curricula in the nuclear field that could attract talented students to the nuclear science. Opportunity to get financial support is also an important objective. SWOT analyses showed the following critical success factors: stable national strategy and policy for the development and stable financing of education and training with given priority to the nuclear field, good research basis and scientific excellence, establishing a favourable environment and public acceptance of nuclear energy to increase the interest of talented students to enter the nuclear field, investments in nuclear technology, research and training opportunities, including participation in EURATOM projects. Proposed strategies to achieve the objectives were mainly used strengths to take advantage of opportunities. Management of weaknesses by stimulation of university staff by good working conditions, available financial resources, investments in nuclear research centres and opportunities for professional development was also mentioned as a good option. Participation in EURATOM projects is recognized as a good incentive and correction factor in the field of education and training. Providing administrative support for management of EU project carried out by university and research institutions and improved cooperation between national education and research institutions and research teams working in nuclear field was proposed.

### 4.2 Definition of internal and external factors

SWOT analyses revealed that all participating new member states recognized very similar strengths, opportunities, weaknesses and threats for all thematic areas:

1. In most countries the potential of human resources was evaluated as strength, although they found that the number of good experts is not sufficient and is even decreasing due to retirement and insufficient interest of young and talented students for nuclear field.

2. Some countries have current investments in nuclear research and technology, and also some kind of stable funding provided by special funds, but found great risk of sustaining these opportunities in future. Investment in the nuclear technology field was appreciated as important factor for promotion of participation in EURATOM programs.

3. Lack of systematic planning on institutional and national level and bad management in research institutions was described as the most important weakness/threat. Consequently, the competitiveness of institutions and research groups from new member states in EURATOM tenders is reduced.

4. Topics of EURATOM tenders were not always consistent with the interests and needs of new member states. Countries with small nuclear program could not manage to participate in comprehensive projects but they would be able and willing to participate in smaller projects.
5 GUIDELINS FOR IMPROVING NEW MEMBER STATES PARTICIPATION IN EURATOM PROJECTS

SWOT confrontation matrix provided proposals to improve the conditions for participation of new member states in EURATOM projects. Proposed strategies were based on the critical success factors which were also common to all new member states participants, namely improving institutional and national policy making, strategic planning and setting the nuclear research and education among priorities, improving cooperation between all activity holders in nuclear research and development, including cooperation with universities, and informing about EURATOM program in nuclear study programs.

Priority was given to strategies where external opportunities are used to support internal strengths and to overcome internal weaknesses. This indicates strong potential of new member states which is not used enough. Participation in EURATOM programs was recognised as an important research and development mechanisms for converting new member states weaknesses to strengths.

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