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ESTABLISHING THE APPLICATIVE DEVELOPMENT NECESSARY ELEMENTS FOR TECHNOLOGICAL TRANSFER

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Abstract: *In this paper, we use the inquiry not simply focusing on the techniques, procedures and tools to collect information (as for the survey) but, for a better understanding, the inquiry methods are combined with other research techniques, such as the scientific observation or the documentary and content analysis. Establishing by inquiry the applicative development necessary elements for technological transfer it represents a scientific method of investigation, by avoiding as much as possible errors that may occur, some due to the faulty procedures and others due to the respondents' lack of cooperation.*

Key words: *transfer, applicative development, mining activities, inquiry, European area of research, technology*.

1. INTRODUCTION

We are using in this paper the inquiry elaborated for the project *Enlarging the academia – industry partnership to prepare FP7 projects in mining activities desasters*, contract No. 259, financed within the Excellence Research Program, Module III, where research teams from CTTIE – Bucharest, University "Valahia" Targoviste, AMCSIT – Politehnica and S.C. Zernike Innovation Partners SRL are involved.

2. OBJECTIVES

The inquiry was aimed to identify the needs and interests of the potential collaborators in the research – development – innovation activity, raw materials suppliers and technologies beneficiaries in order to promote:

- the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors;
- the salt transformation technology in the dissolving voids resulted at salt rocks exploitation;
- the filling technology of the voids resulted from mine coal exploitation with steam power plant ashes.

Thus, the inquiry focused on aspects concerning the following aspects:

- the importance of technologies;
- the need for implementation;
- the availability to contribute to implementation;
- the impact of technologies;
- the use of technologies;
- the participation as research partners, raw materials suppliers, etc.;
- the experience in valorising the useful substances in effluents;
- collaborations in this particular domain;
- problems with the heavy metals content effluents and
- specific company information (market segment, company products, nature of goods, number of employees).

3. ELABORATING THE INQUIRY

3.1. Technologies presentation

Taken into account the previously defined objectives, three specific technologies were taken into consideration, thus:

- the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors;
- the salt transformation technology in the dissolving voids resulted at salt rocks exploitation;
- the filling technology of the voids resulted from mine coal exploitation with steam power plant ashes for which the presentation sheets and the inquiry were elaborated.

The presentation sheets used for the survey were customized by using the logos of all the partners involved in the project.

3.2. Questionnaire elaboration

As far as the questions were defined, from the four possible types: closed questions – single answer, multiple answers; matrix questions – single and multiple answers; open questions – free answer, numerical answer, etc.; ranking questions – rank and constant sum, for the inquiry elaboration, closed questions, but also matrix questions were used [1, 2].

3.3. Defining the types of respondents

After the elaboration and customizing of the inquiry, the types of respondents were defined (Table 1), given the project particularities and its objectives.

The enterprises were selected from the AMCSIT – "Politehnica" personal database [3].

3.4. Defining the means to invite the respondents and to transmit the inquiry

In order to invite the respondents to answer, the inquiry was sent via e-mail. Each institution in Table 1 received a customized message [4].

Table 1

Types of respondents

No. crt.	The institution legal name
1.	Institutul de Cercetări Metalurgice ICEM SA Bucureşti
2.	Universitatea Tehnică Gheorghe Asachi Iaşi
3.	Institutul Naţional de Cercetare Dezvoltare pentru Inginerie Electrică
4.	Institutul Naţional de Cercetare Dezvoltare pentru Ştiinţe Biologice Bucureşti
5.	Institutul de Chimie Raluca Ripan Cluj Napoca
6.	Institutul Naţional de Cercetare Dezvoltare pentru Utilaj Petrolier IPCUP Ploieşti
7.	Institutul Naţional de Ciment CEPROCIM SA Bucureşti
8.	Institutul Naţional de Cercetare Dezvoltare Turbomotoare COMOTI Bucureşti
9.	Institutul de Cercetare pentru Rafinării şi Petrochimie ICERP SA Ploieşti
10.	Institutul Naţional de Cercetare Dezvoltare pentru Textile şi Pielărie INCDTP Bucureşti
11.	ICPET ECO SA
12.	Institutul de Proiectare pentru Sectoare Calde IPSC SA Bucureşti
13.	Institutul Naţional de Cercetare Dezvoltare şi Încercări pentru Electrotehnică ICMET Craiova
14.	Universitatea din Craiova
15.	Institutul Naţional de Cercetare Dezvoltare pentru Energie ICEMENERG Bucureşti
16.	Institutul Naţional de Cercetare Dezvoltare pentru Geologie şi GeoEcologie Marină GEOECOMAR Bucureşti
17.	Universitatea Tehnică din Cluj-Napoca
18.	Institutul de Cercetări Pielărie Încălţăminte CERPI Bucureşti
19.	Institutul Naţional de Cercetare Dezvoltare pentru Metale şi Resurse Radioactive – ICPMRR Bucureşti
20.	Institutul de Cercetări pentru Echipamente şi Tehnologii în Construcţii
21.	Institutul de Cercetare Proiectare Utilaj Metalurgic şi Prese SC PRESUM PROIECT SA Iaşi
22.	ICPE SA Bistriţa
23.	Institutul de Cercetări Fibre Sintetice SC ICEFS SA Săvineşti
24.	Institutul de Cercetări şi Amenajări Silvice Bucureşti
25.	Institutul de Metale Neferoase şi Rare IMNR SA Bucureşti
26.	Institutul Naţional de Cercetare Dezvoltare pentru Tehnologii Criogenice şi Izotopice ICSI Râmnicu Vâlcea
27.	Institutul Naţional de Cercetare Dezvoltare pentru Pedologie, Agrochimie şi Protecţia Mediului Bucureşti
28.	Institutul Naţional de Sticlă INS SA Bucureşti
29.	Universitatea Transilvania din Braşov
30.	METAV SA Bucureşti
31.	Institutul de Cercetare Proiectare pentru Construcţii de Maşini ICTCM SA din Bucureşti
32.	CCPPR SA Alba Iulia
33.	Institutul Naţional de Cercetare Dezvoltare pentru Inginerie Electrică ICPE-CA SA Bucureşti
…….. etc.	

3.5. Results analysis

Following the answers received, the results were analyzed using the graphic method.

4. MAIN RESULTS

The main results regarding the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors; the salt transformation technology in the dissolving voids resulted at salt rocks exploitation; the filling technology of the voids resulted from mine coal exploitation with steam power plant ashes.

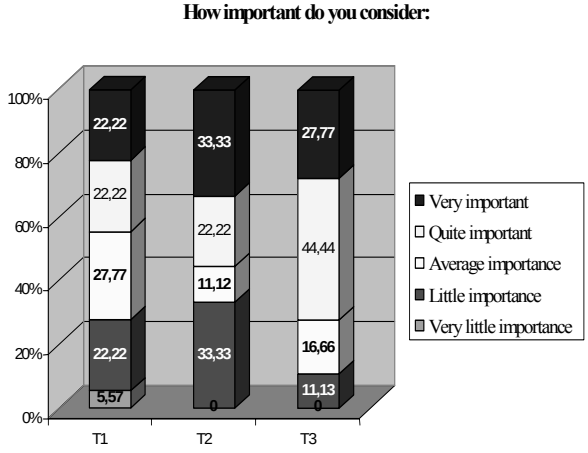

Fig. 1. Importance of the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors.

4.1. Importance

To determine the importance of technology, the respondents were asked to answer the question: How important do you consider: the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors? ...the salt transformation technology in the dissolving voids resulted at salt rocks exploitation? ...the filling technology of the voids resulted from mine coal exploitation with steam power plant ashes?

T1 – the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors;

T2 – the salt transformation technology in the dissolving voids resulted at salt rocks exploitation;

T3 – the filling technology of the voids resulted from mine coal exploitation with steam power plant ashes'

According to Fig. 1, one can notice that for:

T1 – most respondents considered this technology quite important (22.22 %) or very important (22.22 %) (Fig. 1), 27.77 % considered it of average importance, 22.22 % of little importance and 5 % of very little importance;

T2 – most respondents considered this technology very important (33.33 %) or of little importance (33.33 %) (Fig. 1), the rest considering it quite important or of average importance (11.12 %);

T3 – most respondents considered this technology quite important (44.44 %) or very important (27.77 %) (Fig. 1), over 27 % of the respondents considered it of average importance or of very little importance.

One should notice the large number of respondents who attributed high importance to the technologies in question.

4.2. The necessity of implementation

In order to study the need for implementing the technologies, the respondents were asked to provide an answer to the following question: "How necessary do you consider the implementation of the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors?" "...the salt transformation technology in the dissolving voids re-

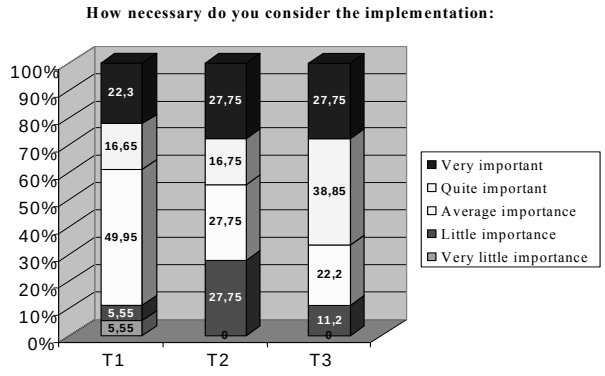

Fig. 2. Necessity of the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors implementation.

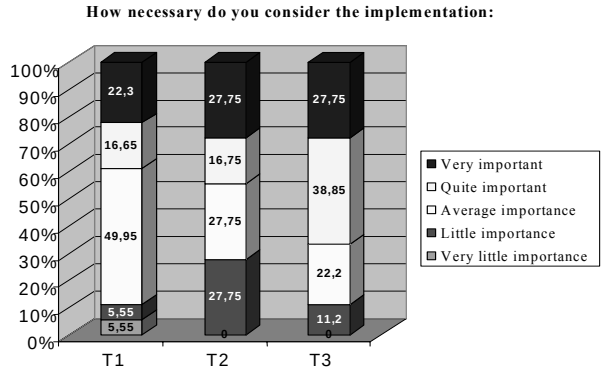

Fig. 2. Necessity of the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors implementation.

sulted at salt rocks exploitation?" "... the filling technology of the voids resulted from mine coal exploitation with steam power plant ashes? "

Fig. 2 shows that for:

T1 – most respondents considered this technology of average importance (49.95 %) or very important (22.3 %), 16.65 % considered it quite important, the rest (over 10 %) seeing the technology as of little importance or very little importance.

T2 – most respondents considered this technology very important (27.75 %), of little importance (27.75 %) or of average importance (27.75 %), the rest considering it quite important (16.75 %).

T3 – most respondents considered this technology quite important (38.85 %), only 27.75 % considered it very important or of average importance.

Moreover, just as for the first question, numerous respondents have pointed out the high importance (50 %) of implementing the analyzed technologies.

4.3. Availability to contribute to implementation

For the question "Would you be willing to implement the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors? " "...the salt transformation technology in the dissolving voids resulted at salt rocks exploitation?" "... the filling technology of the voids resulted from mine coal exploitation with steam power plant ashes? ", for the first two technologies 330% of the respondents proved to be less willing, 22.22 % neutral and 33 % very willing (Fig. 3).

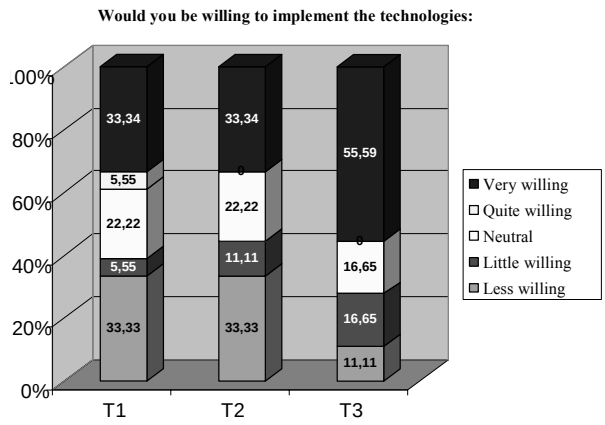

Fig. 3. Availability of the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors implementation.

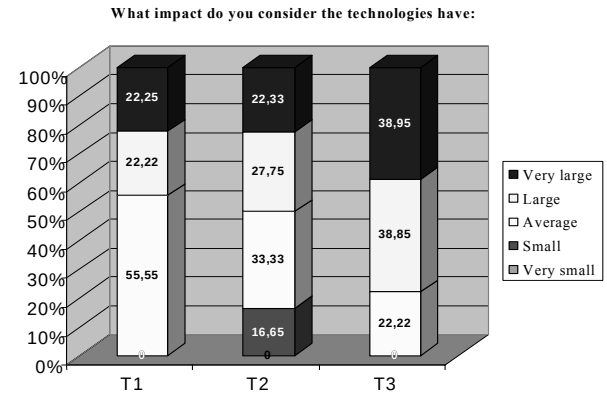

Fig. 4. Impact of the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors implementation.

As far as the third technology is concerned, over 55 % of the respondents have declared they are very willing, the rest being neutral (16.65 %), little willing (16.65 %) or even less willing (11.11 %).

4.4. Impact

While determining the impact of the studied ecological technologies (Fig. 4) ("What impact do you consider the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors?" "... the salt transformation technology in the dissolving voids resulted at salt rocks exploitation? "... the filling technology of the voids resulted from mine coal exploitation with steam power plant ashes have? "), for T1 the respondents considered it to be average (55.55 %) large (22.2 %) or very large (22.25 %).

For the T2 technology, the answers varied, 33 % of the respondents considering it of average impact, over 47 % as having a large and very large impact and 16.65 % a small impact.

Most respondents, over 77 % selected the answers large or very large impact.

4.5. The use

In order to find out how willing would the respondents be to use the technologies, they were asked to answer the following question: "How willing would you be to use the unconventional environment depolution tech-

Table 2

Usability of technology implementation

	Not so w %	willing	%	%	Very willing
T1	44.4	16.65	5.55	5.55	27.85
T2	49.95	5.55	11.11	11.11	22.28
T3	22.2	22.2	0	16.65	38.95

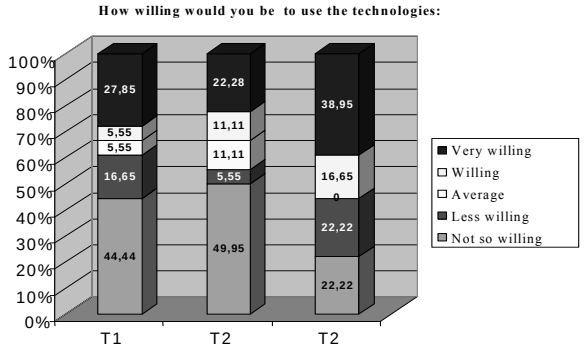

Fig. 5. Usability of the unconventional environment depolution technology by injecting residual waters and slimes in geological collectors implementation.

nology by injecting residual waters and slimes in geological collectors? " "...the salt transformation technology in the dissolving voids resulted at salt rocks exploitation?" "... the filling technology of the voids resulted from mine coal exploitation with steam power plant ashes? "

Thus, for T1 and T2, the respondents are not so willing to use the technologies (44.4 % for T1 and 49.95 % for T2), only 27.85 % (for T1) / 22.28 % (for T2) of the respondents are very willing to use the technologies. For T3, the responses were well balanced, over half (55.6 %) are willing and very willing to use the technologies, while 44.4 % are less willing or not so willing (Fig. 5).

4.6. Participation

As far as the participation is concerned, as research partner, raw materials supplier or beneficiary, it is interesting to notice that all respondents have declared themselves interested to get involved as research partners.

5. CONCLUSIONS

While analyzing the inquiry results, the following can be noticed:

- the respondents consider the presented technologies as quite important or very important;
- the need to implement the technologies in question is considered quite important for more than half of the respondents;
- 50 % of the respondents are willing to contribute to the technologies implementation;
- over 70 % percieved the T3 technology as having a large or very large impact, or average / large impact for T1 and T2 technologies;
- for T1 and T2, the respondents were not so willing to use the technologies (44.4% for T1 and 49.95% for T2), and only 27.85 % for T1 and 22.28 % for T2 are very willing. For T3, the responses were well balanced, over half (55.6 %) are willing and very willing to use the technologies, while 44.4 % are less willing or not so willing;
- all respondents wish to participate as research partner;
- for T3, 37.5 % of the respondents owe technologies, 12.5 % are raw materials suppliers and 50 % fit the "others" category;
- for T3 the respondents declared they have worked with steam power plant ashes and know this residue, while for T2, at the category others, they detailed the water isotopic marking (stream, precipitations) in the salt rocks exploitation area.
- 16.67 % of the respondents collaborate with foreign partners from other countries and 83.33 % with partners from Europe;
- 64.71 % of the respondents do not wish to make an official presentation, while 47.05 % can involve other partners in a related project;
- 32 % of the respondents are legal persons (intermediary consumers), 26 % are legal persons (end consumers), 12 % natural persons (end condumers), 24 % higher education institutions and only 6 % other categories;
- 56 % of the company products are designed for the national market, 22 % for the local market and 22 % for the international market [5].

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