

A new program for incorporative research between research centers and Oil and Gas industry in I.R. of IRAN, involving Scientific Centers of Excellence – Case study in NIGC

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Abstract

In 2010, the Deputy Petroleum Minister in Research and Technology of I.R. IRAN has launched a new program aimed at reintegrating of university research potentials (also private research sector) and rebuilding university-industry research network which is the first step of the strategic innovation, research and technology executive constitution of Iranian petroleum ministry. It involves the establishment of Scientific Centers of Excellence (SCOE) in major universities, which is a part of general research, technology and innovation plan in petroleum ministry. This program has had a major impact on the universities in order to become qualified and fulfill the R&D projects requirements in oil and gas industry in Iran. It is too early to achieve the success, but the initial results are admissible. This paper explains the updated procedure for evaluation, selecting and networking the SCOE in academia and the reasons for establishing the qualified research groups to execute the R&D projects based on the systematic approach of MADM frameworks and industrial prospects, and current status of the progressive program. After that the performance and evaluation process is mentioned, and also states some of initiative problems during three years. Several recommendations are collected and organized and announced publicly for SCOE, based on evaluation the results and feed backs from relevant R&T departments of petroleum ministry sub-companies (the end-users) for the effective operations and continues improvement (Deming Cycle).

Keywords

Scientific Centers of Excellence (SCOE), Ministry of Petroleum (MOP), Systematic Approach, MADM, Evaluation

1. Introduction

The research findings and importance of this knowledge as a core competencies is obvious for new technology development, so many firms have a plan to adapt the R&D policies to optimize research limited resources. The research potential in academic society of local country is the most valuable industrial innovation. This paper purpose to study the new program for contribution of Scientific Centers of Excellence (SCOE) in Ministry of Petroleum (MOP) of I.R. of IRAN and all sub-companies research activities. The main emphasis will be on the aimed at reintegrating of university research potentials (also private research sector) and rebuilding university-industry research network. Nowadays the diversity of academic research institute are increasing rapidly, so the importance of developing the effective corporation model which follows win-win policy both for governmental and non-governmental firms in research field is increasing dramatically. In 2010 the policymakers in Research and Technology of Minister of Petroleum of Iran is started a new program base on systemic approach for target orienting of research and development projects in Ministry of petroleum and all sub-companies. One of sub-plans of this program is facilitating the interaction research between Scientific Centers of Excellence and Oil and Gas industry.

Based on one of the outstanding points from upstream documents in vision 2020 for I.R. of IRAN which is "Achieving the first position in economic, scientific and technology in the region of Southeast Asia"; the ministry of petroleum and 4 main sub-companies (National Iranian Oil, Gas, Petrochemical and Oil Refining & Distribution Companies) attempt to outsource their research and technology needs (which were identified and ranked previously) annually. By this way the driving force for promoting the level of science and technology in the universities and research centers in Iran is provided by one of the most important ministry of Iran. For this purpose "Identifying and ranking the research centers" by the systematic program for incorporative research between these centers and the body of oil and gas industry is one of the challenging and one of the important concerns for outsourcers and the regulatory bodies.

This paper purports to study the contribution of R&D program aiming the "Identifying and Ranking the Scientific Centers of Excellence (SCOE)" which are applying for research projects of Ministry of Petroleum and the sub-companies and a particular emphasis will be placed on case study in National Iranian Gas Company (NIGC) R&D activities about this program. Regarding the previous procedure (before 2010) of outsourcing of research project in NIGC, R&D department, selecting the effective research group for the ranked and identified research needs of gas industry is totally based on the previous activities and the consent of the company from previous projects. So base on this fact, many research potential overall the research centers and universities which are capable for executing these project maybe dismissed in this procedure, is one of the challenges of CEO and the R&T council in NIGC and the other sub-companies of Ministry of Petroleum (MOP). This program aim to the following targets:

1. Using the maximum research capacity in home country for executing outstanding research needs of oil and gas industry.
2. Identifying the week points of research centers regarding the ranked research topics
3. Target orienting the R&D investment and MOP supports of research groups for stating the research culture and developing local technology and exploring the new technologies

Academia Issues:

The main issues facing research society regarding industrial research are as below:

- Limited funds for research
- Universities organization which is not flexible enough

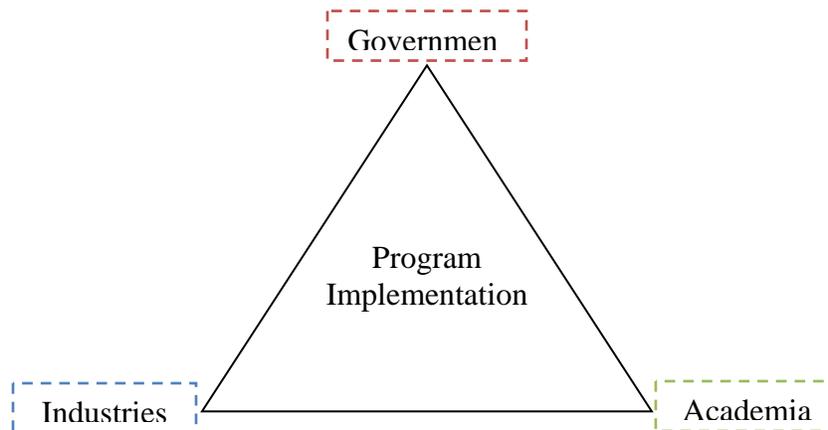


Figure 1: Effective Corporation Program for research centers

The critical success factor of such these programs and its implementation effectiveness of usage of scientific core and the centers of technology development is becoming a main concern all around the world. An efficient framework probably needs the government, industry and research centers (Academia) effective corporation which is including:

- The time gap between research findings and commercialization must be declined.
- Using spin-off companies on the boundary of universities
- Usage of regionalization of research and spreading the linkage to the far universities.
- Joint venture and joint research promotion

In brief, nowadays for solving the complicated research needs; the linkage framework between above elements must be strengthening.

2. Roles

2.1. Oil and Gas Industry Role

The industry role was policy making and supporting the research centers in academic and private sector.

2.2. Universities Role

Most of the universities are education oriented and were weak in laboratory facilities and research funds except those which were industrial universities. But during the time these weaknesses decreased due to research group linkage and increasing the research funds by government and Oil and gas industry.

2.3. Oil and gas industry Role

After implementation of this program the share of R&D in annual budgeting is increased so the universities and other private research sector are profited and expand their research activities.

2.4. Corporation Role

The corporation between oil and gas industry and research centers can explore the research potential and help to reach the upstream roadmap of technology in vision of 2020 of I.R. of Iran.

By the way the consequence of the corporation between above elements led the R&D system toward the new innovation which is great in number and quality.

In the meantime the infrastructure for International Corporation in research field is needed which should be prepared by effective efforts of government, industry and universities.

3. SCOE Structures

3.1. Basic Structure

Based on previous studies about the research centers (see the references) in scientific center of excellence structure each research group is nominated for a special process/technology area, aiming at increasing research groups effectiveness at the target level. This structure is absorb the willingness of any firms and is preferred regarding the following special features:

- i. All skills and Competencies are condensed in each field of research in SCOE
- ii. As a matter of Coordination. This is preferred because it is very easy.
- iii. The most important issue, the economy, it can be achieved the most economic structure
- iv. The knowledge/ findings are centralized

As it can be seen in Figure 1, the defined task for every elements is assigned to it and findings of each unit is send back to the center, so, the research elements small and specific R&D task which is a part of continues planned activity which are arranged and managed by the center of excellence in a R&D project management framework. Based on above specifications of this structure it is most preferable structure, More or less the ideal condition is seldom happened.



Figure 2: Basic Scientific Center of Excellence Structure

3.2. Network Structure

This type of structure is designed for sharing the findings and increasing synergy. One of the key success factors in scientific center of excellence structure is the diffusion of corporative culture inside research group and outside the group in corporation with the other centers which is considered for designing the evaluation method of these groups which is noted later. The main remark of this structure is shorten the research period and allow units to share their resources as well as information and solving the bottlenecks immediately. The results are shared among the research elements; although the IT infrastructure is available for communication the periodic meetings, summits and forums must be held periodically regarding to effectiveness of communication, so the overall cost of research may be increased. The critical success factors of network supervisor structure are as below:

- i. Holding meeting for project definition
- ii. Assigning the tasks and their responsibilities and authorities among research elements
- iii. The coordination mechanisms between various research elements
- iv. The complementary knowledge exchange is easy in this structure



Figure 3: Network Structure of Center of Excellence

3.3. Hierarchy Associated Structure

Regarding the technology progressive acceleration and increasing technical progress in every fields of technology among the oil and gas industry; and based on above structures the expert group of MOP is introduced a hierarchy model which is associated of these two structures; in this structure the number of available innovation cores are increased. This structure collects all the specification of previous structures but coordination issue is very important which should be taken into account as a project manager capability as a key success factor. Regarding the economy of this structure the overall costs is increasing but the research quality is also increased. The role of supportive research group is performing adaptive activities or providing technical support. The critical issue which should be considered is the balance of responsibility and authorization between the SCOEs which should be managed by research project manager. As a key success factor of this structure, is to ensure that the corporation inside/outside the research group is done effective by usage of managerial techniques. In this structure as it will be mentioned later the supportive research group could be choose among the overseas known research groups. Regarding the reviewed structure for summarizing the specialization and comparing between these structures, please refer to Table 1.

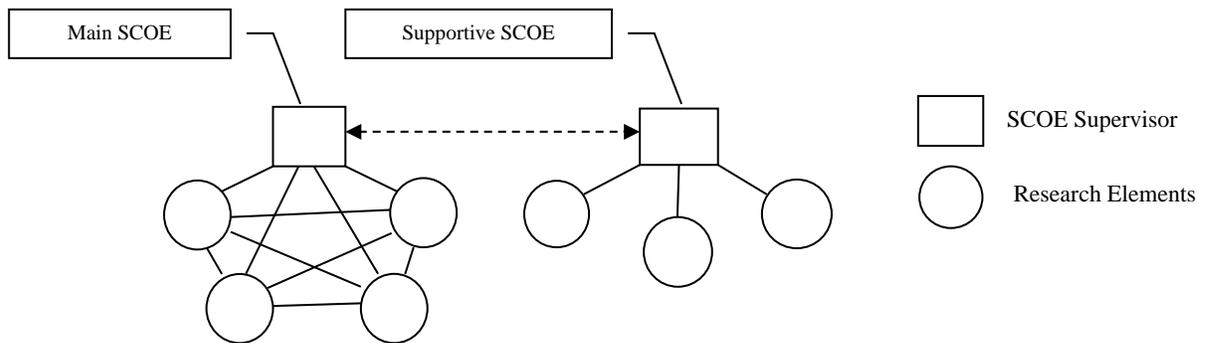


Figure 4: Hierarchy associated Structure of Center of Excellence

Table 1: SCOE Structures

		Specification	Project Definition	Finding Data Transfer
SCOE Structures	Basic SCOE Structure	All skills are condensed in SCOE Coordination is easy The most economic structure	Based on previous research filed the manager define the new project	All the data is collected by SCOE Supervisor
	Network SCOE Structure	Increasing synergy Diffusing of corporative culture Results are shared Meeting/Forums are held periodically	Global meetings is held for project definition among the research elements	The data is exchanged and shared in the network
	Hierarchy associated Structure	All skills are condensed in SCOE Increasing synergy Diffusing of corporative culture Results are shared Meeting/Forums are held periodically	The main SCOE hold a meeting for project definition and inform the supportive SCOE about it	The exchange and sharing data is done by IT infrastructure

4. The Center of Excellence Program

In 2010, The Deputy Minister in Research and technology of Iranian Petroleum Ministry is initiated a program in order to rearranging and constricting of academic research groups to response the research needs of oil and gas industry in all the major universities in Iran. The result was Center of Excellence. This program brought great challenges and competition for universities of Iran in order to create the research clusters based on industrial needs and competition for gaining higher ranks in oil ministry evaluation. The test run is done up to now and the following result is gained, (see Table 2): As it can be seen in Figure 5 the relation between gas industry and Scientific Center of Excellences has several benefits which are mentioned on this figure:

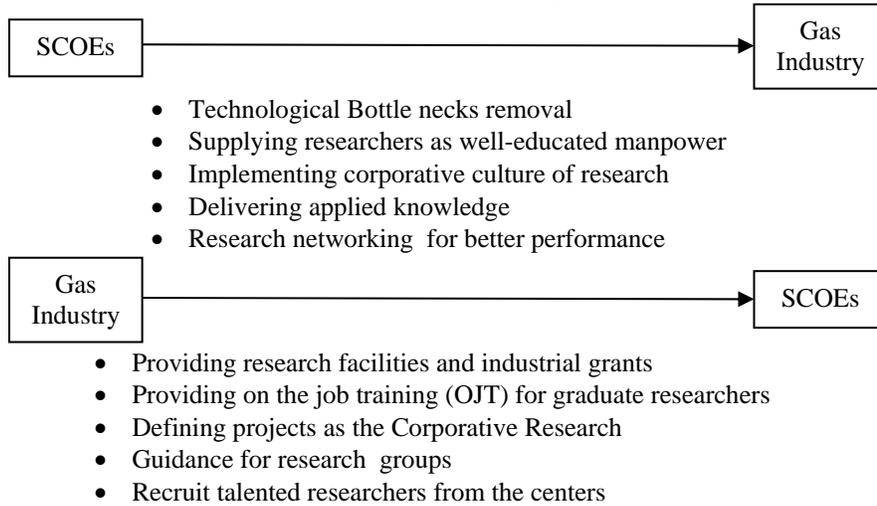


Figure 5: Industry – SCOE interactions and benefits

Table 2: Statistical report of SCOE in Ministry of Petroleum System (March-2013)

Item	Description	No.
1	Total Register Research Groups	5398
2	System Validated Research Groups	1368
3	Certified Groups	1335

4.1. Objectives, Function and Activities

The program aiming the following purposes:

- Responding to oil and gas industry in Iran
- Widening the research field among the universities and decentralization research process
- Empowering the research society in academic centers
- Promoting cross-disciplines research projects in academic centers
- Networking and corporation behavior and research society
- Reinforcing oil and gas industry and universities links for better research results

The program has a vital role for Iranian oil and gas science and technology and has the below functions:

- Doing multi-disciplinary research
Regarding the objectives of this program many industrial research projects are needed multi-disciplines and corporation is the main part of characteristics in such these projects.
- Training activities
The SCOE must train the graduated students in various field from design, integration, corporation and ... as the oil and gas industry willing it.
- Widening the research fields
The researchers transfer the experience and know-how, conferences, training courses and publications.

The main activities of this program are as below:

- To solve major operation bottlenecks based on research
- Facilitating knowledge stream exchange
- Promoting corporation spirit in researchers, problem solving and research networking
- Increasing quality and effectiveness of research projects in oil and gas industry

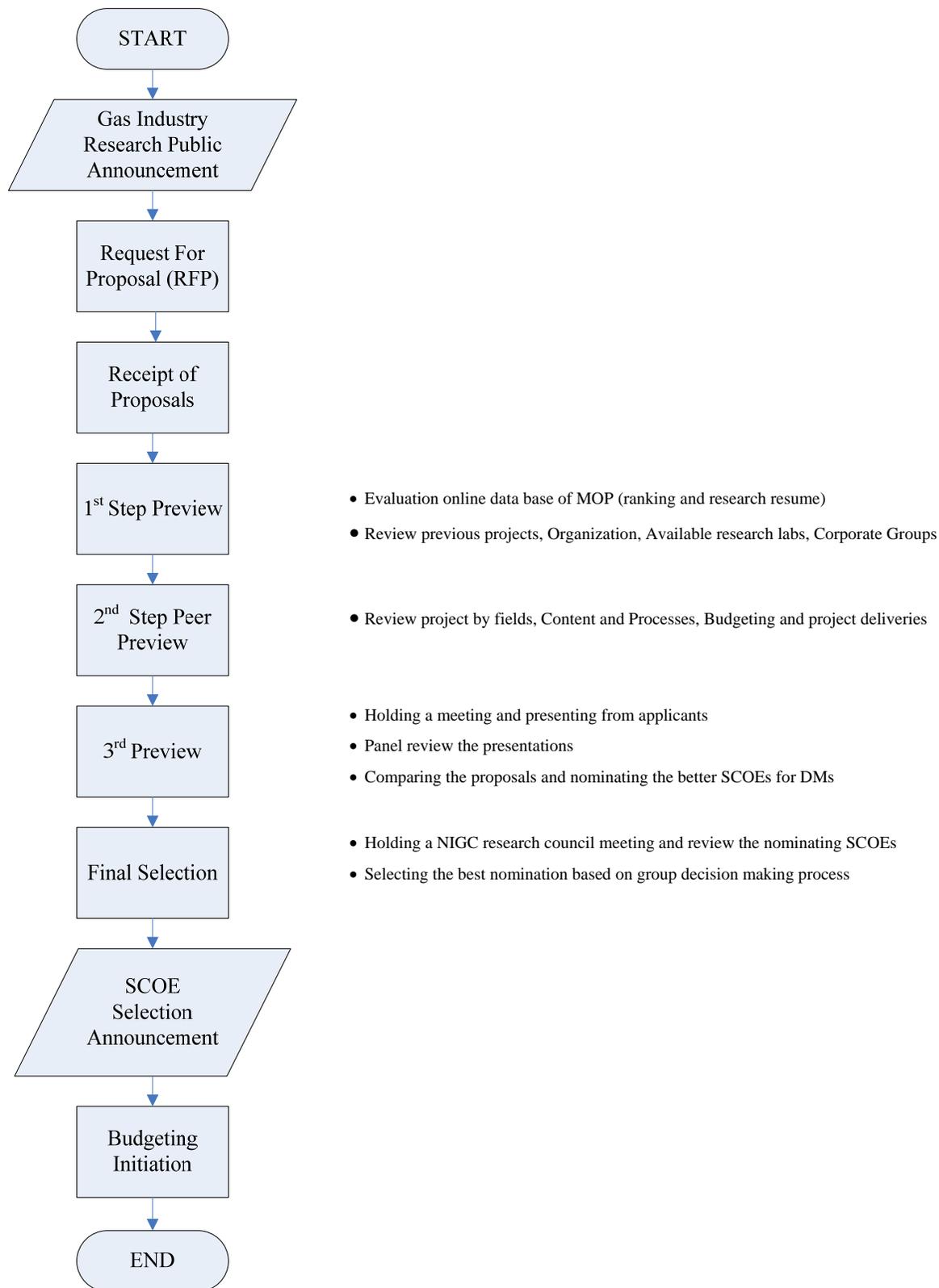


Figure 5: SCOE selection flowchart for a typical research project in NIGC

4.2. A case study in National Iranian Gas Company

As one of the main sub-companies of Ministry of Oil in I.R. of IRAN, the N.I.G.C. research and Technology directorate is implemented the research policies of petroleum ministry which has been developed since 2010 in recent years; Several committees has formed for initiating a global procedure in order to choose adequate research centers for research projects in this company and all 35 sub-companies. So many comments has been received from research centers and research consultants in order to improve the choosing model and proposed in executive meetings has been implemented in this model. All the sub-companies of N.I.G.C. are applying the uniform procedure for choosing an appropriate research center of a special research project. Figure 5 illustrate the Scientific Center of Excellence (SCOE) selection flowchart for a typical research project in National Iranian Gas Company (NIGC) and all its sub companies.

4.3. Systemic Approach and the Selection Procedure for SCOE clustering and ranking

Industrial – Academic Corporation Organizing Activities

- Forming secretariat and organization for this program
- Inviting the main sub-companies to introduce experts for the strategic and executive committees
- Searching about previous researches and best practices which has been done before via publication, articles and so on.
- Declaring and partitioning the research fields in all sub-companies
- Meanwhile designing universal model for evaluating, logical comparison and ranking the research groups among the universities and private sector.
- Designing the web-based application (<http://scoe.mop.ir>) linking to the data-base and gathering the data via created accounts and pre-evaluating the entered data
- Evaluating the research groups periodically by expert committees of Iranian Ministry of Petroleum.
- Gathering feedbacks and implementing based on continuous improvement (Deming Cycle)

4.4. Methodology

Based on previous research reviews (please see the references) the evaluation model is designed based on group decision making and Simple Additive Weighting (SAW) method of Multi Attribute Decision Making (MADM).

- Determining Attributes
- Weighting the Attributes by DMs by MADM-SAW method
- Evaluation method - Scoring

Table 3: SCOE's Evaluation Criteria

Item	Criteria Description		Minimum Requirement
1	Main Research Group	Number of Researchers	4
2		Research Topic Related Articles	8
3		Related Written Books, Awards, Patents	1
4		Related Research Projects	1
5		Unrelated Research Projects	3
6		MS thesis Guidance	4
7		PhD thesis Guidance	2
8	Equipments and research facilities	Available Related Laboratory Equipments/Facilities	5
9	Collaborate research group	Collaborate research group	1

After introducing the executive committee based on brain storming meeting the development of set of evaluation attributes for assessing the SCOE's past research performance and their potential for future industrial researches was done. Meanwhile the fields of research were developed in subcommittees in sub-company of ministry of petroleum (e.g. in NIGC, this list is indicating the research needs in every activities of NIGC). Based on these meetings, and the necessary criteria for assessing previous research background of SCOE's summaries in three categories:

- Criteria for the main research group
- Criteria for equipments and research facilities
- Criteria for collaborate research group

5. Recommendation, Conclusion and Discussion

As it was mentioned the initiate date of this program was 2010, so it is too soon to judge about success of this program; but the program has a major impact 1st at oil and gas industry research in Iran, and 2nd on industrial and engineering faculties of Iranian academic society and bring several challenges and completion among the universities and their research centers.

In order to avoid general failure of such these programs unique recommendations are listed below:

Recommendation

- Ministry of Petroleum should only support the interested cross-disciplinary centers regarding the nature of industrial demands.
- Each SCOE should have progressive measuring mile-stones and report them to the MOP SCOE secretariat regularly.
- Each SCOE must develop their corporation specially overseas collaboration for better performance
- SCOE's should clearly define their objectives and goals which could be tangible in limited project duration

Conclusion and Discussion

The regular transition from blind investment – to innovation oriented development is the critical step toward the strategic goals in 2020 vision of I.R. of Iran and sustainable economic growth. In this framework, the self-reliance in industrial technologies especially in the main industries such as oil and gas dramatically is increased. The driving force for gaining the needed technology is put on domestic universities research centers and spin-off companies on the border of universities. In order to effective usage of limited research resources from sponsored industry, such these program must be launched and create the effective linkage between industry and academic research centers.

The progress of this program main define new vision for future including

- Human Resource training for oil and gas industry

By working in oil and gas industry the researchers are expected to change the research oriented universities environment

- Sponsoring and support research potential in academic centers

Such these programs stimulate the academic research potential in oil and gas industry and in case of technological issues the industry may use them freely.

- Research networking plays the role of international research corporation

By sponsoring the research projects by oil and gas industry the SCOE's will have the opportunities for overseas research collaboration and accessing the scientific information and the benefits of this collaboration comes back to the industry (win-win strategy)

- Developing competitiveness Core-Competency

Regarding the defined criteria as the result, the research groups develop and improve their capabilities and being strong for international competitiveness as the core-competencies.

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Biography

Ali Massaeli is a Senior Expert in Industrial Inspection Department of National Iranian Gas Company, Tehran- I.R. of IRAN. He earned B.Sc. in Chemical Engineering from Azad University of South Tehran; M.Sc. in Industrial Engineering – System Management and Productivity from Azad University of Qazvin. He has several research activities such as publishing internal journal of IGU (International Gas Union) and international conference papers. He has several industrial training courses in Chem. and Industrial Engineering and co- authoring and the editor of process engineering in oil and gas industry. He is one of the senior experts in SCOE integrating executive committee of Petroleum Ministry of I.R. of IRAN. In the latest IEOM he received Outstanding Industry Awards (IEOM 2012, Istanbul-Turkey). Recently he is nominating for Industrial Committee of IEOM 2014, Bali, Indonesia