

University of Malaya

From the Selected Works of Nader Ale Ebrahim

July 7, 2006

Analysis of Opportunities and Challenges for R&D Management and the Role of the R&D Society for its Improvement – A Case Study in Iran

Reza R. Tavakkoli-Moghaddam

Nader Ale Ebrahim

Arash Golnam

M. Vasei

Ali Ghazizadeh-Moghaddam



Available at: <https://works.bepress.com/alebrahim/35/>

Analysis of Opportunities and Challenges for R&D Management and the Role of the R&D Society for its Improvement – A Case Study in Iran

R. Tavakkoli-Moghaddam¹, N. Ale-Ebrahim², A. Golnam²,
M. Vasei¹, A. Ghazizadeh-Moghaddam²

1- Department of Industrial Engineering, Faculty of Engineering, University of Tehran,

P.O. Box: 11365/4563, Tehran, Iran, E-mail: tavakoli@ut.ac.ir

2- The R&D Society of Iran industries and Mines

Apt 8, 2nd floor, Madar Sq., Tehran, Iran, E-mail: iranrd@iranrd.org

Research and Development (R&D) management in Iran is faced to many barriers and obstacles, in which R&D units are considered as the basic core of the product development and innovation. Due to structural shortcomings, a great number of organizations and industries have not been able to find their actual status. There are about different 1141 R&D units with a dispersion pattern in Iran. This paper considers and analyzes the R&D case study in one of the provinces located in the north part of Iran in order to enhance the potential R&D activities in respect with the industrialized areas and zones. In this province, there are about 2504 industrial units of which there are only 44 R&D units certified by the state government. However, there are limit numbers of these R&D units that are extensively active. This paper also addresses the current status in respect with the R&D activities to find out why there is a lack and depression of these activities in the industrial units. By considering the opportunity and challenges of these R&D units, there is a need to change these units to be active in order to quickly respond the market and demand requirements. Finally, a few alternative solutions and improvement plans are proposed, in which the Iranian R&D Society is responsible for supporting and succeeding these action plans towards the organization goals.

1. Introduction:

Based on the Iran's 20 year vision, Iran will have become a developed country, ranking the first from the scientific, technological and economic point of view in the Middle East. One of the requirements being ahead of others first from the scientific, technological and economic point of view in the Middle East is having an

appropriate approach in investing correctly in different industries and giving the production units a competitive edge in the highly competitive international market. As a result, R&D units as key factors accounting for country's industrial development should act based on a suitable approach.

R&D programs, like other business units, are under pressure to yield concrete results. Consequently

analysts are increasingly focused on key success factors, such as time-market, lower R&D cost and greater control over the uncertainty that is an inherent part of any R&D activity (Brown and Eisenherent, 1998).

As a matter of fact, the R&D unit as the center of innovation in the organization can play a critically important role in covering the market needs and providing the organization with an edge over the other competitors. Properly managing R&D processes has long been a matter of debate and considered a troublesome area with no simple answers; ranging from an Achilles heel in some firms to the sole basis of competition for others (Nobelis, 2003).

In this case study, we analyze the position of R&D in one of the regions in Iran by considering the challenges and the problems in the way of R&D from one side and the opportunities for R&D growth. Finally, we take a look at the role of R&D Society of Iranian Industries and Mines for overcoming and removing the obstacles or the problems in the way of R&D growth.

In fact, an effective R&D Management in the region leads to the creation of creativity and innovation in the industrial sectors that triggers success in the business. In this case study, for the purpose of analyzing the requirements of an effective R&D, we will focus on Mazandaran Province. Mazandaran is one of the Industrial provinces in the north part of Iran in which many reputable companies are active. It is worth mentioning that some of the R&D units in Mazandaran have achieved the highest ranks among other R&D units in Iran. Considering the presence of experts and specialists and the possibility of local investments the potential for R&D growth exist in Mazandaran.

2. The status of industry in Mazandaran:

Mazandaran, which is the home to around 2500 active industrial units, is considered as one of the pillars of Iran's industry and high rates of investment have been done in Mazandaran with the aim of industrial development in this region. It's worth mentioning that most of these investments are in the Food, Cellulose, Electronic and Textile Industries. As you can see the R&D units have had a small contribution to Mazandaran Industries, in only 1.75 percent of the industrial units, R&D activities are done, and these units are mainly in the field of food industries.

3. Analysis of R&D situation

At this phase of the case study, we centralized our activities on two major areas:

- 1) The reasons why no attention was paid to R&D by some industrial units
- 2) The performance of the units with active R&D departments

3-1) The reasons why no attention was paid to R&D by some industrial units

As the first step, a questionnaire about the reasons why no tendency had been shown toward R&D was prepared and sent to 1000 industrial unit (with more than 20 personnel) that did not have an R&D Department.

Table 1: Number of Industrial units (with permission of Industrial Ministry)

No	Kind of industry	Courtesy of Industrial Ministry		Units have R&D Certify		Share of fruition	
		Number	Percent of Total	Number	Percent of Total	Percent from each industry	Percent from industry
1	Food, pharmacy, Hygienic	954	38.25	12	27.27	1.26	.48
2	Textile, leather, Clothing	512	20.53	3	6.82	.59	.12
3	cellulose	121	4.85	2	4.55	1.65	.08
4	Chemical	154	6.17	4	9.09	2.6	.16
5	Non-metallic Mineral	116	4.65	3	6.82	2.59	.12
6	Electronic	188	7.54	2	4.55	1.06	.08
7	Automotive and related	143	5.73	6	13.64	4.2	.24
8	Machinery and equipment Design	58	2.33	3	6.82	5.17	.12
9	Metallic	94	3.77	5	11.36	5.32	.2
10	Foundry ,casting, Chang metal forming	154	6.17	4	9.09	2.6	.16
	Total	2494	100	44	100	1.76	1.76

A total of 235 units responded to the questionnaire, a summary of the ideas gathered from the managing directors of these units comes below:

- *Not being directly involved in R&D*

38 industrial units outsourced the R&D activities, although they were fully aware of the importance of R&D they preferred to do such activities through outsourcing them, mostly to universities and research institutions, this way they did not need to assign some of their human resources to R&D, so getting R&D Unit was not important for them.

- *Not Requiring R&D Unit*

Up to year 2003, having R&D Unit would lead to financial exemptions; up to this year there was a strong leniency to ward obtaining R&D Units among the Industrial units. When these financial exceptions were no longer enforced, the number of the industrial units demanding R&D decreased. 11 Units out of the newly established units didn't tend to obtain R&D units and their activities were done without R&D Units.

- *Not having enough budget*

45 out of 235 units, surveyed, acknowledged the significance and the position of R&D in their company. But due to the financial problems high risk of the R&D Units couldn't invest in this field, this response was mainly given by small and medium-sized enterprises.

- *Not delivery in R&D activities*

Many of the respondents did not hold a positive view many of the respondents, regarding and R&D activities did not have clear definition of R&D Management. They were mainly definition of R&D Management. They were mainly unaware of the R&D role in their business success.

As mentioned earlier in the problems on the way of R&D, the main challenges are unawareness of R&D effect on the business and the lack of appropriate support of R&D by the relevant organizations. Considering the tendency for investment in this region and the high competition, the R&D Society can have an important role in high strength earning the R&D units.

3-2) The performance of Mazandaran R&D units

After going through the reasons why some units did not tend to R&D activities now in this section we take a closer look at the performance of the active R&D Units in Mazandaran. In order to analyze the development strategies of R&D, some interviews were arranged with R&D Managers and a questionnaire including questions dealing with the analysis of the problems regarding the condition of the R&D units was submitted.

The questionnaire consists of the following issues:

1. The position of R&D unit in the organization in the organization structure
2. specification of the R&D unit human Resource
3. Access to the Scientific Database
4. The condition of facilities in the R&D units.
5. Type of the R&D activities performances
6. R&D intensity
7. Managers in sight in to R&D Management
8. The reason why some industrial units don't toward R&D
9. Governmental or non governmental R&D unit.
10. The problems and challenges in the of R&D activities.

To conclude the results more efficiently, we analyze our findings in the following categories.

3-2-1-The position of R&D unit in the organization in the organization structure

The position of the R&D Units differs in an organization based on the size and position status of the company. In the government units that constitute the big industrial units of the region, R&D is placed in higher managerial level, however in smaller industrial units that belonged to the private sector. The R&D unit received less attention most of these unit received less attention, most of these units are semi active they were be semi active, they were mainly established for the mere purpose of benefiting from the privilege granted by the government.

3-2-2- specification of the R&D unit human resource

Human Resource in R&D Management had a relatively high scientific level compared to other units. However, the active personal in R&D units were mainly part timer. In the private sectors, most of the R&D personals were employed part time, in the governmental sector. On the other hand, they were mainly fulltime employers. According to managerial interview, there is no shortage regarding the human resource.

The figures show that R&D activities, in fact there is at most 2 dedicated personals in these units, that shows this fact, the activation in these units are mainly done on a project basis and when more help is required on personal of other departments are merged into this unit.

Table 2: The status of human resource in Mazandaran

Full time Human resource in R&D units of Mazandaran			
Under-graduated	graduated	Post-graduated	PHD
17	36	12	7
Part time Human resource in R&D units of Mazandaran			
Under-graduated	graduated	Post-graduated	PHD
4	12	23	14

3-2-3-Access to the scientific information bank:

One of the access and availability of professional journal and references is one of the requirements of the R&D units, a big difference can be felt this regards between private and governmental organization.

In Governmental units that as mentioned earlier were bigger had access and possessed appropriate technical references; however the private units did not have a suitable condition in this regard.

3-2-4-The condition of the facilities in R&D units

From the facilities point of view due to the investment, made most of units were in a good condition and the R&D units faced fewer problem in this regard. However, some of the machines that had high prices were common between R&D and other units.

3-2-5-R&D Activities Type

The Type of R&D Activities can be summarized as follows. The reason for presenting these figures in percentage is that among 80 projects that were studied most of them have multiple applications. As you can see in Table 3, most of the activities are centralized cost reduction and upgrading productivity.

3-2-6- R&D intensity

Unfortunately, 9 out of 44 units that were examined were inactive and no considerable research activity was done. In these units in the past years, most of the active units belonged to governmental organizational among which Mazandaran Pulp & paper Company has been the first R&D unit in the past years. There are some other similar companies in governmental section as well.

3-2-7- Managers insight to R&D management

Managers of the above mentioned units, despite believing in paying in attention to R&D did not have a common definition of R&D performance .providing information about R&D management and its benefits can play in important role in upgrading the position of R&D in business units.

Table 3: Type of industrial research in Mazandaran

Research Result	Percentage
Formulation Reform	6
Upgrading productivity	18
Replacement Material	3
Energy change	4
Redesign	2
Reduction in waste	8
Cost Reduction	14
Reducing environmental pollution	12
New product Development	4
Localization and local content	10

3-2-8-Reason why some industrial don't more toward R&D:

High cost and high investment risk and the weak monitor of high managerial level can be considered as some of the reasons for the inactiveness of show R&D units. This problem has its roots in not applying R&D management systems correctly.

As the next reason accounting for this problem the financial exemptions that were previously granted by government to the R&D units, which are currently over now, can be reflected to.

3-2-9- Possession status of R&D units.

Governmental or non governmental R&D units

3-2-10- challenges and problem at the way of R&D units.

4. Research results

The research carried out shows that approximately 9 units of the units possessing research and development certificates are inactive (about 20%) and approximately 41% of the units are active in an area related to their field at an average level without utilizing scientific and research systems, which are mostly in the area of product development and design, as well as the reduction of costs on a daily basis (without definition of research and development projects and regarding analysis of four dimensional technology, the 4 dimensions do not possess related balance and unity. Regarding the machinery of the mentioned units, they are all at very suitable levels. In the case of intelligence they are at suitable levels and the information level is average, while in the case of organizational structure they are at a very weak levels.

5- Suggestions

The results of the research was considered by the related experts and professionals and following proposals for the development of research and development activities in the area has been suggested:

- Formation of R&D clusters in various industrial sectors in an assortment of industries of provinces.
- Possibility of access to specialized information banks for members of industrial clusters.
- Creation of database network for production units to exchange technical information.
- Creation of research audit teams and expansion of development and research activity in the private sector.
- Special provision for research and development units through facilities provided by research and development society.

Table 4- Kind of challenges and problems inside R&D Units

Kind of problem	No	Problem	
CHALLENGES	1	The lack of connection between R&D Similar group unit	
	2	Unclearly The status of Research priority & Target in industries	
	3	Not having proper understanding from R&D management	
	4	Weakness of Private R&D centre in province	
	5	Uncommercialized the result of Industrial Research	
	6	Unconsecrated to R&D management as base of Technology development	
	7	Lack of real situation of R&D in research structure of country	
	8	Lack of cooperation of Related factor of society for encourage of R&D	
	9	Lack of connection between R&D unit specially between engineering services unit	
	10	Have same view to research center with other service center	
	11	Not having any special tax exemption	
	12	Concentrate only in University research	
	13	Doing parallel repeated activity	
PROBLEMS IN ORGANIZATION	GENERAL PROBLEM	1	Un Justifiable investment in R&D units for managers
		2	Appropriation insufficient budget for R&D Units
		3	Lack of suitable budgeting for R&D unit
		4	Being Multi Responsibility of manager of R&D unit
		5	Not being support by top management in R&D unit
	Special to R&D center	1	Lack of efficiency and not having expert human force in R&D unit
		2	Not having priority in R&D unit which adjust with production requirement
		3	Not having enough knowledge about R&D strategy by Production unit
		4	Not having evaluation system for R&D project
		5	Not having motivation system which adjust with researchers value
		6	Not having suitable management system in administration of R&D
		7	Lack of productivity in R&D
		8	Not being practical project
		9	Less of R&D Budget

- Creation of investment and tax holiday incentives for creation of research and development units within production units.
- Creation of executive directives for local evaluation of research and development units.
- Creation of annual evaluation and promotion of efficiency mechanisms within research and development units by society.

6. Overall suggestions

In consideration of the evaluations made within this specific study, the results arrived at has been through the Research And Development Society axis as the centre of research and development units, composed of 1033 research and development units, which can be related to all of research and development units within the country.

For implementation of above proposals the Research and Development Society may be remembered as a centre for organization of research and development units. This specialized Society consisting of 1033 research and development units can give coverage to proposed solutions within the framework of following projects:

6-1- Assignment of role and status of research and development management within industrial units.

As mentioned before one of the reasons for breakdown of research and development has been Challenges of assignment of role and status of research and development within industrial units, therefore, the Society, as founder of expansion of development and research in industry of the country, must present a clear definition of research and development management and the merits of its utilization in advancement of units within the competitive market through the holding of regional seminars and conferences. For increase the role of R&D management, Society should design performance evaluation system for their members to measure the contribution of R&D projects to economic value creation through measure of the following issues:

- Technological success, which influences future revenues as it may affect customer satisfaction ;
- R&D productivity , which influences cash out outflows occurring before t^*
- Adherence to scheduling , which influences revenues
- The degree of integration with the manufacturing function which influences cost after t^*
- The degree of integration with the marketing function .which again may influence revenues (Chiesa, 1996).

6-2- Implementation of training courses at various levels:

One of the factors for Challenges of research and development units has been the lack of familiarity of research and development unit personnel with the principles of research and development management. Therefore, to this end the Society intends to train research unit personnel at three levels:

- Familiarity with the principles of research & development management
- Familiarity with principles of risk management and research project management
- Familiarity with strategy implementation and techniques for comparing production unit needs with research and development unit activities

6-3- Tax incentives:

As an affiliate of the Ministry of Industry and Mines, the Society can play a very important role in coordination with the Ministry to define tax incentives for research and development units.

One of the most common methods for support of research and development units especially within the private sector worldwide is offering of tax holidays. Such incentives may be suitable examples for the society to consider in this matter.

6-4- Formation of industrial clusters:

Most research and development units in the non-governmental sector are composed of small units which require scientific and financial cooperation with other related units like themselves for the success of their projects taking into consideration their high investment needs. Bearing in mind its liaison function, the Research and Development Society can play an important role in the formation of research and development clusters.

6-5- Formation of specialized committee:

Creation of the means for the exchange of scientific and specialized information is another area through which the society can assist in developing the scientific foundation of research and development units. The formation of specialized societies in various industries to coordinate research and development activities can play an important role in the practical advancement of research and development units.

6-6- The research and development fund:

In view of the fact that the non-governmental sector units possess little investment and are considered high risk for research projects they have a lower share in performing research projects within the country. With

the aim of further supporting the expansion of research and development activities in the private sector, the Research and Development Society in cooperation with the Ministry of Science, Research and Technology have taken steps to create a support fund for development and research in order to support research and development units. The society is considering Establishment of a research and development bank in the future in order to support investment in the research and development sector.

6-7- Presentation of research priorities in various industries:

Another dilemma of research and development units is the Challenges to identify research priorities in order to cover the requirements of the market. As a guide for research and development units, the Research and Development Society must specify the investment priorities in each industrial sector.

6-8- Scientific support:

Access to the latest scientific and specialized information is another area to enhance research and development units in industrial units. Many research and development units in the industrial sector cannot access this information due to lack of availability of technical data banks because of high costs. Given that the number of requests in the various industrial fields, the society can take action to purchase and make available the mentioned specialized data banks.

6-9- Classification of research and development units:

As pointed out in band 3, one of the areas of support of research and development units is the creation of financial and tax holiday incentives. Considering the restrictions of Ministry of Industry and Mines in awarding of financial facilities, the society may play an important role in facilitating financial aid by classification of active research and development units according to priority of activity.

6-10- Selection of best research and development personnel and units:

Since in the present cultural environment, the general opinion of the public is that research activities are mainly carried out within universities and research institutes. The selection of the best research and development personnel and units in the industrial sector will encourage and influence research and development units in the industrial sector, leading to a rise in status of research and development within the industries of the country.

6-11- Design of extensive research and development structure:

One requirement in order to gain the top status in the scientific, economic and technical arenas in the region is to have a suitable outlook for correct investment in the various industries as well as making the production units capable enough to participate in the competitive international market. Research and development units are key factors in taking steps to develop the industry within the country, which also requires suitable practical performance. Therefore, designing a research and development management structure which can make research and development units comply with organizational strategies, assist them in taking the direction towards unified activities and is capable of prioritizing research areas is an immediate requirement. Such management structure will be able to reduce costs and dangers in the most optimal way through risk analysis as well as by the making the information system unified with the technical and commercial units in order to provide market requirements at the suitable time.

With regard to “management system “it is possible to detect a wide consensus of concerning the increase in importance of R&D management systems (control of costs, Development of international integration ,programming); this orientation , However , is not in keeping with a similar consensus concerning the use of suitable management instruments, in particular, methods for evaluating R&D productivity are not yet widespread, and neither are those for checking the

result of planning activities, nor those concerning the selection of the project. In any case, productivity and the quality of research and development have clearly improved in the past 5 years (agreement convergence). The contingency analysis would seem to indicate that only companies with significant investments in R&D are able to use the advanced methods of management

Bearing in mind this subject, the society has the duty of guiding research and development units according to policy. The design of an extensive research and development structure is another area in which the society can assist in improving research and development units.

7. References

- Brown, S.; Eisenhardt, K. (1998): *Competing on the edge*, Harvard Business School Press, Boston.
- Chiesa, V.; Massela, C. (1996): Searching for an effective measure of R&D performance, *Management Decision*, 34/7, P. 49-57
- Nobelis, D. (2004). Towards the sixth generation of R&D Management, *International Journal of Project Management*, 22/2004, p. 369-375
- Petroni, G ; Verbano, C. (2001): The evolution of industrial research in Italy: characteristics and perspectives, *Technovation* 21/2001, p. 585-594.
- Quelin, B. (2000): Core competencies, R&D management and partnerships, *European Management Journal*, 18/2000, p. 476-487.