

Modeling and Diagnosis of Innovation Process in R&D Centers

Case study: Research Institute of Petroleum Industry (RIPI) in Iran

Aylar Pourmohammad Mohammad Farhadi Narges Joda

Rasad Technology Policy and Management Group, Idea Pardazan, Research Institute of Petroleum Industry (RIPI), Tehran, Iran

(E-mail: purmohamada@ripi.ir, m.farhadi@ymail.com, na_joda@rail.iust.ac.ir)

Abstract Nowadays, innovation has been converted from an agent of gaining and preserving competitive advantage for companies into a key element of their survival. The innovation process may seem complicated, creative and even unpredictable. But as Drucker said, there are some principles for innovation. In this area, research organizations, institutes and centers that their mission is innovation, creation or acquisition of technologies play a major role. These organizations are pioneers in innovation process in Iran. Thus it's necessary to improve their innovation processes and increase their effectiveness. In this paper, we will analyze and dissect the idea management process in research institute of petroleum industry (one of the most important research centers in Iran) as a major part of the innovation process step by step and model it by means of Tichy and Hornstein's methodology. Then we will use the literature of innovation and idea management for adjusting and comparing the current process to desired one that is mentioned in the literature and applied in pioneer organizations. After that we will make some suggestions for improving and revising the current process.

Key words innovation process, idea management, tichy, Hornstein's methodology

1 Introduction

1.1 Innovation management

In order to preserve competitive advantage in market, it's necessary to innovate constantly to create new products, services and processes. Innovation improves trading with costumers, increases profit margin and brand loyalty. Without innovation, presentable value of company would be imitative and it would lead to competence in price of products. [1]

Innovation can be developed through observing the communications, monitoring the opportunities and taking them. [5]

Innovation management includes the following processes:

- 1) Identifying opportunities to supply new products and services;
- 2) Managing a collection of R&D plans;
- 3) Planning and developing new products and services;
- 4) Supplying new services and products to the market.

Idea management

Idea management is the process of collecting commercial ideas, developing them into implementing themes, assessing and selecting superior themes and measuring their efficiency. [6]

In other words, idea management is the organization's ability to effectively identify, attract and control the information related to new ideas or technologies which can lead to completely different and innovative products or services. [2]

Lack of idea management system may spoil the organizations in following ways:

Decision makers can't get access to most of ideas so they are missed, yet it's possible that competitors get access to some of them.

Sometimes people believe in their ideas in a way that they may give up the company to put their idea into practice and establish a new company. Consequently they may form a major competitor.

Main elements of idea management process

In order to exploit the company's potential for innovation, it's necessary to take an approach connected with five steps of idea management process (figure 1).

In figure 2, steps of idea management, linkage between them and different tools applied in each case are presented.

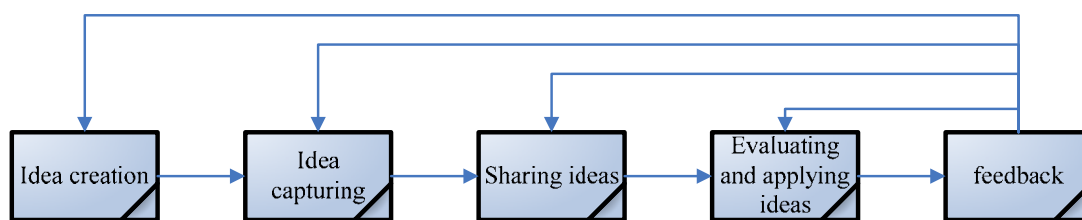


Figure 1 Idea Management Process

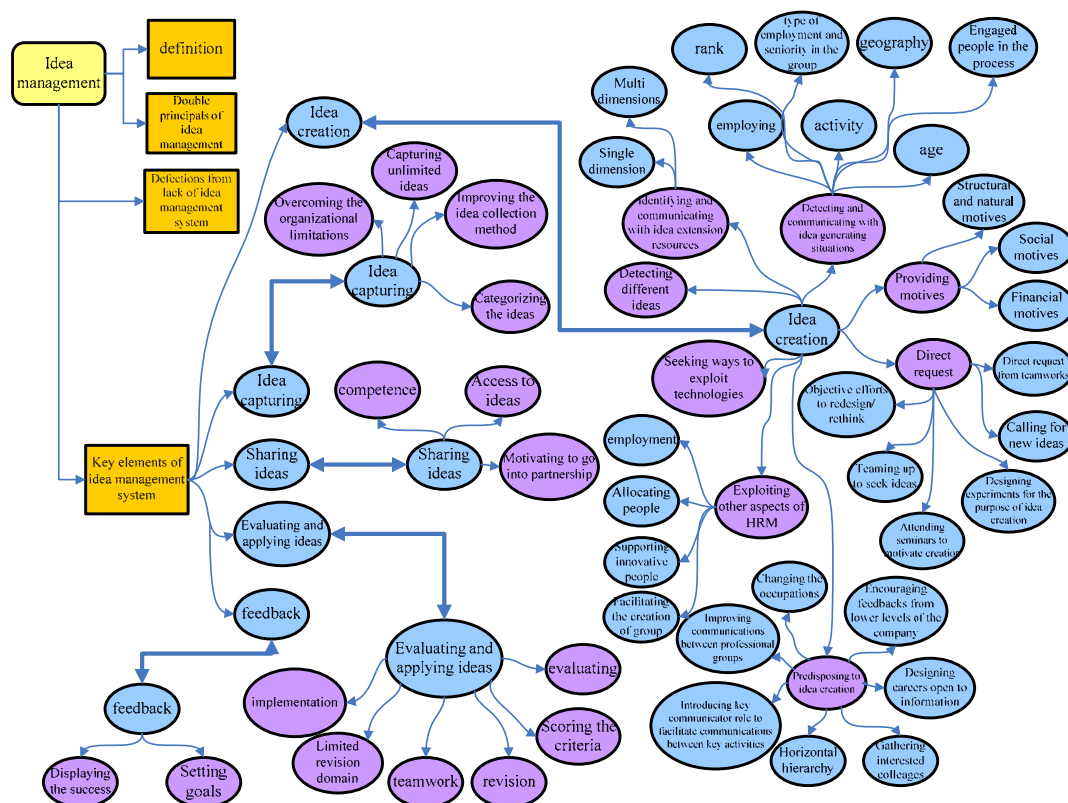


Figure 2 The Relation between Elements of Idea Management Process

2 Idea Management Process in Research Institute of Petroleum Industry (RIPI)

“Research Institute of Petroleum Industry” was found in 1959 by the name of “Department of Research and Development for National Iranian Oil Company”. Its mission was to research on applications of gas and petroleum. After Iranian revolution, its name was changed to “Center for Scientific Researches and Services”. And ultimately in 1989, it was changed into “Research Institute of Petroleum Industry” for the purpose of conducting fundamental, developmental and applied researches. Now there are 400 employees as faculty of RIPI. Figure 3 shows the structure of education in RIPI.

In this part of paper, the idea management process in RIPI is presented. This is the result of investigating documents of RIPI and several interviews with people who are in this process.

Innovation process in RIPI starts when researchers and experts send their ideas in the format of some idea forms to their research unit council which includes the directors of that research unit. The person who has filled the idea form must attend this session and defend his/her idea.

After the primary processing, ideas are sent to technology and innovation department through each research unit. The most conscious person of that issue in each research unit as well as some members of the department who are knowledgeable about management and know-how, have two main responsibilities:

- 1) Designing the weighting indexes and the methodology of assessing ideas;

- 2) Making triple evaluations after designing the indexes:
- An evaluation by people out of RIPI
 - An evaluation by the representative of each research unit of RIPI; the representatives are asked to rank the ideas of their unit.
 - An evaluation by the experts of the technology and innovation department or by the advisors and experts of RIPI.

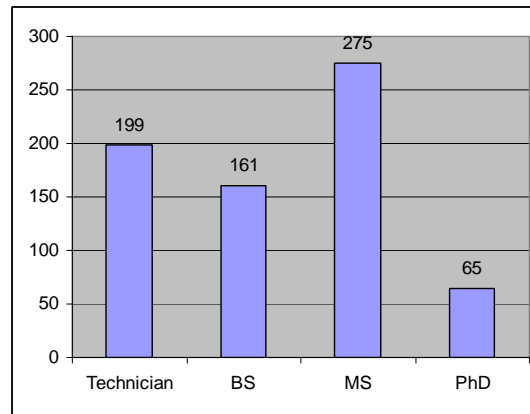


Figure 3 Structure of Education in RIPI

After aggregating these three scores, the ideas that score less than 60 are going to be omitted. The omitted ideas with good potential are sent to commercial department for marketing and sale. If the omitted idea seems raw, it would be archived.

Now it's time to integrate ideas and after that reach agreement between different research units of RIPI to work jointly on similar ideas. The representatives are asked to integrate ideas through some meetings. In cases which different units fail to reach agreement, the technology and innovation department has to interfere.

After the first integration, it is asked to document "plan booklets" and send them to technology department by head of each research unit. The time schedule, the number of required experts and their proficiencies, equipment requirements, list of activities, etc are specified in these booklets comprehensively. From now on, the ideas are converted into implementation plans. Each plan is divided into a number of phases and each phase is divided into a number of projects. The responsible research unit for each project is determined.

Finally after the second integration of some ideas and approval by the technology and innovation department, the cycle of marketing and negotiating with petroleum ministry's quadruplet R&Ds is started. If an agreement is reached with the customer, after the board of directors' approval, each plan's director is determined through a meeting attended by head of technology and innovation department, head of that research unit and perhaps its representative. Usually the idea owner takes on the plan responsibility.

Over two years and until the latest stages of the evaluation, all ideas are gathered. But after the ideas are sent to the board of directors, the process would be stopped. From now on there are two ways to approve new ideas:

The first way is to insert this idea into one of the approved plans. If it was a great idea but couldn't be inserted in one of those plans, the RIPI itself would finance it; in other words it would have an interior employer. Figure 4 shows the idea management process in RIPI.

At first the organizational structure of RIPI was pyramidal but now it has a semi-matrix shape (balanced matrix organization). Figure 5 shows the plan oriented structure in RIPI.

3 Modeling Innovation Process in RIPI

In order to model the innovation process in RIPI, we apply Tichy and Hornstein's methodology. According to this methodology, we have to list the most important and effective elements of the process (in the identification phase) and categorize them according to similarities or overlaps between them in some dimensions. Some elements can be categorized as more than one category (table 1) [4].

The idea management process in RIPI

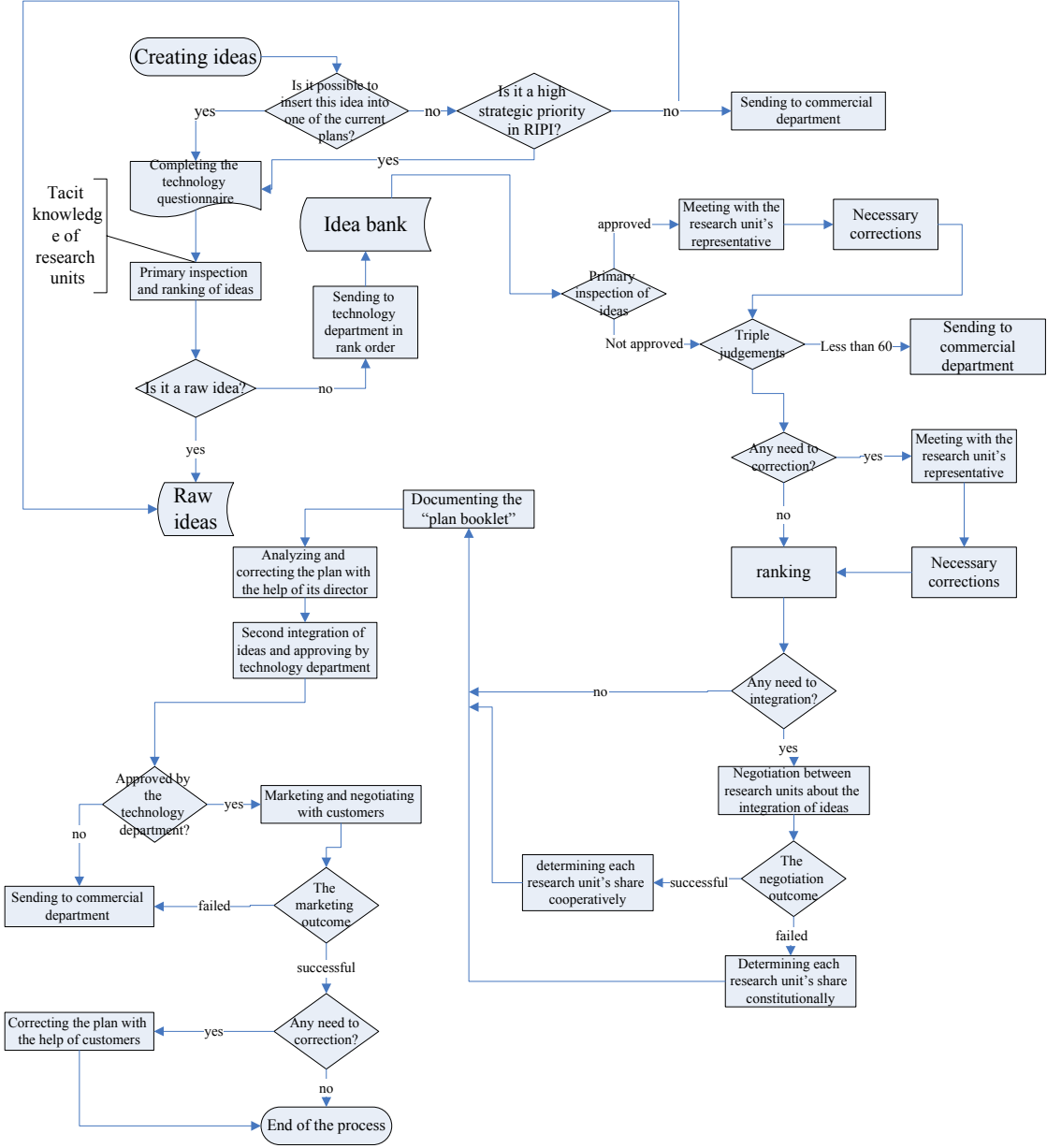


Figure 4 The Idea Management Process in RIPI [3]

The interactions between categories are illustrated in table 2. This table is completed based on the view of our team.

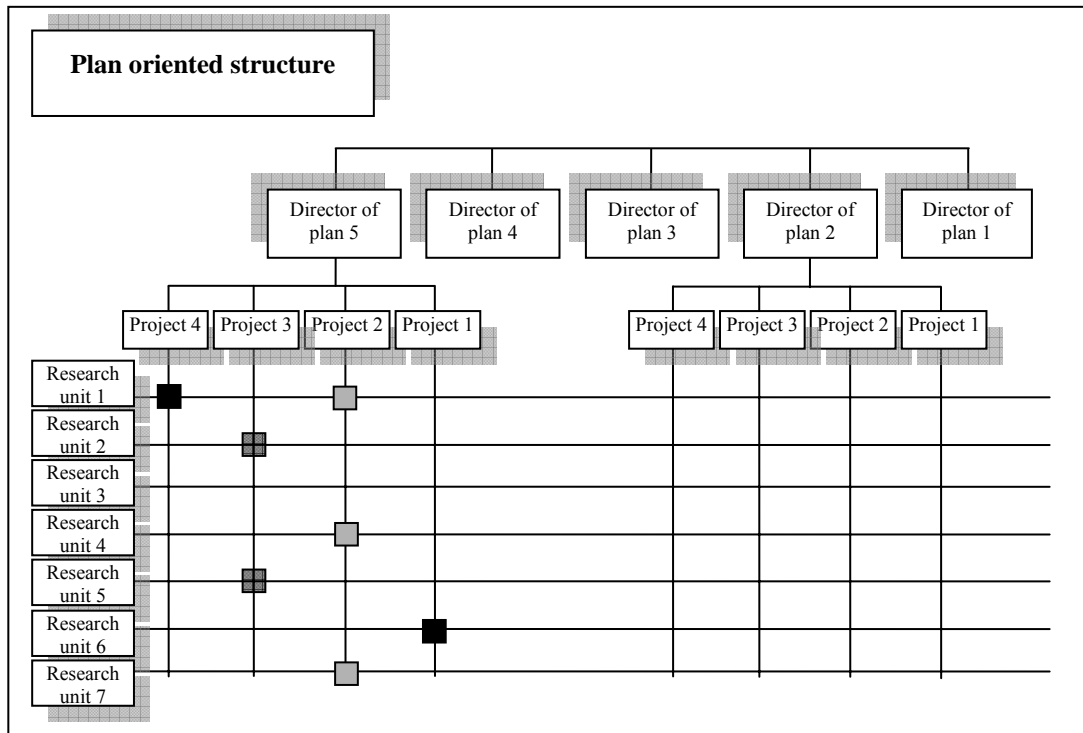


Figure 5 Plan Oriented Structure in RIPI

Table 1 The Effective Elements in the Innovation Process in RIPI

Process	Organizational Structure	Relationships	Organizational Culture	Strategy	Resources
<ul style="list-style-type: none"> Idea evaluation criteria and methods Feasibility studies Technology questionnaire Plan booklet The order of activities The rapidity of process Sharing the ideas Categorizing and documenting ideas Creating and capturing ideas Learning 	<ul style="list-style-type: none"> evaluation council Representatives of research units The position of plan director Organizational learning 	<ul style="list-style-type: none"> Interior relationships (announcement, ...) Exterior relationships (customers, universities, ...) Marketing and selling the ideas 	<ul style="list-style-type: none"> Team working Justice in evaluation Justice in selecting plans' directors Keeping the organizational secrets 	<ul style="list-style-type: none"> RIPI's mission and macro goals The Iranian fourth five year development program (2005-2010) 	<ul style="list-style-type: none"> Human resource Human resource management Technological capabilities and abilities of RIPI Features of the plan director Awarding Technology Idea security

Table 2 Relationships between Different Categories

	Process	Organizational Structure	Relationships	Organizational Culture	Strategy	Resources
Process	-	1	2	1	-	-
Organizational Structure	2	-	2	1	-	-
Relationships	1	1	-	2	1	1
Organizational Culture	-	2	2	-	1	-
Strategy	1	2	1	1	-	2
Resources	1	-	2	1	-	-

Figure 6 shows the graphical model of Innovation process and its effective elements.

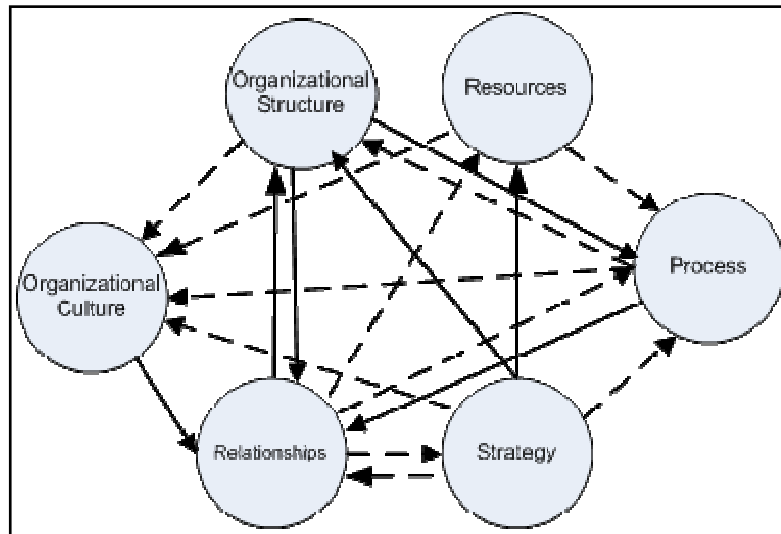


Figure 6 Innovation Process Model

4 Conclusion

Comparing current relationships between elements with the desired one, these suggestions have been made:

- 1) Revising the idea creation process
 - The heavy emphasis on creativity of employees and not using systematic methods is not rational.
 - It is essential to make the idea creation methods indigenous and make it appropriate for the features of RIPI.
- 2) Introducing the “key communicator” role
 - To recognize knowledge resources, to participate in creating ideas and to support the sale of new ideas.
 - To announce new advances in each area to the key decision makers.
 - To connect inside and outside of RIPI in order to market the ideas.
- 3) Improving the idea capturing process
 - Applying a website or local network.
 - Applying an online technology questionnaire.
 - The benefits of network idea capturing are:
 - Accelerating the idea registration.
 - Promoting the opportunity for all researchers to cooperate in idea improvement.
 - Increasing the clarity and decreasing the bias in idea acceptance and evaluation process.
 - Developing leaning and thus increasing the idea creation effectiveness.
- 4) Increasing the customer partnership in idea management process
- 5) Human resource management
 - Emphasis on an organizational culture which supports creativity.
 - Emphasis on selection process (introspection, high self confidence, the ability to bear weak management, creativity, accepting the ambiguity and so on)
- 6) Revising the scoring system and idea ranking
 - Determining the minimum score for accepting the ideas and scoring them. In the current process, the minimum score is 60. This method is almost similar to a binary method.
- 7) rewarding
 - Rewarding is not only encouraging the employees, but it is also an indicator of organization’s commitment to new idea creation.
 - It is essential to regard the personality differences and expected functions of rewarding. For example:

- Mentioning the names of idea creators in internal magazines and magazines published in Oil ministry.
 - Helping top researchers in attending international conferences.
 - Organizational promotion (it is suitable for individuals who are interested in managerial activities).
 - Organizational promotion for managers who support innovation.
 - 8) Revising the documenting system
 - In the present situation, some of raw ideas may be omitted because of lack of an integrated registration and documentation system.
 - Preparing a bisectional file which contains raw ideas and current ideas.
- The revised process is shown in figure 7.

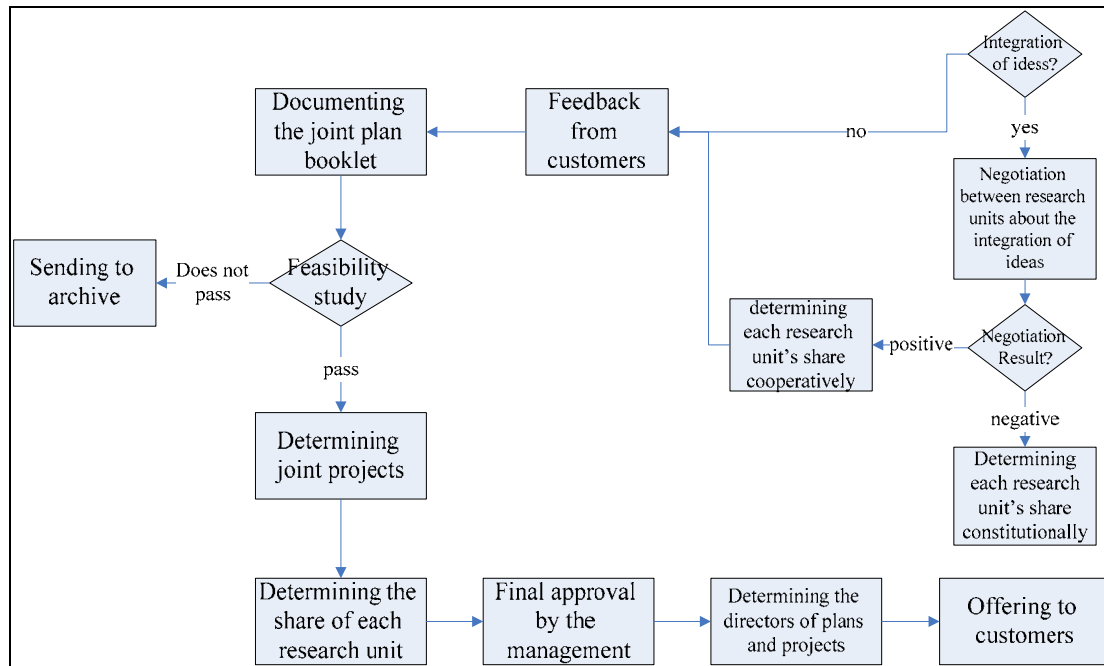


Figure 7 The Revised Process

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