

# Developing a Model for Innovation Assessment in Iranian Steel Industry

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## Abstract

Nowadays, technology is recognized as an ability of new behavior, product and strategy for individual and companies in the economic cycle. Meanwhile, the role of innovation in creating new technology is headed. Scientific and industrial communities have come to the conclusion that organizations can achieve a competitive advantage while focus on innovation. Innovation capabilities as a scientific term is expressed in recent years, that is infrastructure for capability which includes a set of related capabilities that applying new products and their valued. Evaluating innovation capabilities can be helpful in investment and resource allocation. Assessment of innovation capabilities can provides analysis of the situation and potential of firm, and then compare it with the state of competitors, it can help them to take a strategic decisions. In other words, without the benefit of a level of innovation capabilities, innovation is not possible (product/ service or process innovation). In this study we try to assessing the innovation capability of Steel Company, we investigate innovation capability in various aspects and finally determine the extent of the gap in each dimension.

**Keywords:** Innovation, Innovation assessment, Innovation capability, System innovation, Technology

## Introduction

Root of the success of organizations mostly due to the innovation. Competitive advantage may be caused by the size and ownership of assets, but this is more profit for organization that can be use knowledge, technological skills, and experience to create innovation in product or service, then find the ways to develop it (Tidd & Bessant, 2009). Today, communi-

ties have come to the conclusion that the best way to keep long-term advantages in the competitive arena, relying on innovation and enhancement of innovative activities. Two factors have the greatest role in the increasing importance of innovation: first, the speed of technological change in industry and thereby shortening the product life cycles and second, compressed Competition (Boly & Renaud, 2003).

Innovation requires two categories of infrastructure, first, potentially infrastructure are known as "innovation capacity", and the second is the de facto infrastructure that is called "innovation capability". In this study, assess the innovation capability is desired (Arasti, 2009).

Assessment innovation capability can help the managers of firm to pushing resources to the appropriate paths and select appropriate methods to technology acquisition for their investment. For example, low innovation capability in firms are pushing it to the acquisition of technology from external sources and if you have a high innovation capability using domestic or internal capabilities are a priority.

## Literature review

Scholars have offered various definitions of innovation, Turker (2012), in his study states that, economically, inventing something is differentiate from the activity of innovation, the applicability and practicability of the invention or the creation is very important in order to talk about an innovation. Finally he makes the relationship between these definitions in order to, creativity, invention, innovation and then diffusion. Afuah (1998) argues that, innovation is the possibility to use the modern technological tools and market knowledge to offer a new product or service to customers. This defini-

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tion seems to be based on a functional view of the innovation. However, Innovation requires the innovation capability to have emerged. From another perspective, the innovation capability as an activity or technological situation is considered to be related to the number of patents per company (Chen & yang, 2009). From another viewpoint, innovation capabilities are known as a phenomenon which consists of factors such as internal resources, capabilities and external achievements (Forsman, 2011). Also in 2008, Akman and his colleague have examined innovation capability as an important factor to facilitate innovative corporate culture and the ability to understand and respond appropriately to changing conditions and external factors. In this study, try to show the factors that affecting the innovation capabilities of the organization as following: Organizational culture, management, market situation, and environmental conditions. In 2006 the survey was carried out by Assink, innovation capability is defined as an ability to generate and explore radical, new ideas and concepts to experiment with solutions for potential opportunity patterns detected in the market's whitespace and develop them into marketable and effective innovations, leveraging internal and external resources and competencies. In this regard, in 2012, more complete definition is provided, Innovation capabilities in recent years as a scientific term is used in management research, which refers to a set of related abilities that will generate and assign a value to the company in Principled way, This can include products, services, new services or ways to organize the business processes.

Also, innovation capability can provide company's ability to manage rapid the competitive conditions to achieve long-term growth of the company and followed to maintain suitable conditions in this regard (Balane *et al.* 2009). Tarek Khalil believes that innovation means providing products, services, or processes to new markets through new applications of existing technology or the creation and commercialization of new technologies. Schumpeter's view of innovation is not even limited to the technical aspects and organizational aspects are also included (Khalil, 2000). In the other hand, innovation converts knowledge and ideas into new or improved products, processes, or services or to gain a competitive advantage (Microsoft Corporation, 2007). Today, the scientific and industrial communities have come to the conclusion that organizations can maintain the long-term competitive advantage by relying on innovation and strengthen and promote

innovation and innovative activities within their areas, two factors have the greatest role in the growing importance of innovation (Boly & Renaud, 2003):

- 1- The speed of technological change in industry and thereby shortening the product life cycles.
- 2- Compressed Competition.

Innovation Capabilities are the potential of a firm's innovative activities which can be introduced and supply a new products and services, new processes and procedures and new ideas that are associated with the firm (Arasty *et al.*, 2009).

Generally there are two approaches to assess firm-level innovation (Boushehri *et al.*, 2003):

- The first perspective, Achievements of innovative firms such as new products, scientific and technological, patent and etc., are assessed, the second perspective is to assessing the capacity or potential for corporate innovation, readiness for innovation firm is assessing.

As is clear to explore innovation in organizations and in different countries, different studies have been done, Among these studies, researchers have found different factors that affect innovation and innovation capability, Among some of the factors that have been found, some factors have been replicated in several studies, Below in Table 1 can be derived factors that affect the capability of innovation from previous research. The results of table have been used for the preparation of the questionnaire and collecting the data required for this research.

### Introducing a conceptual model

This conceptual model was derived from a literature review of existing models and has been used to design indicators and questionnaires, it shown in Figure 1.



Figure 1: conceptual model

**Table 1: Summary of Literature Review**

Authors	Name of research conducted	Items
Akman and Yilmaz, 2008	Innovation capacity, Innovation strategy and market orientation	<ul style="list-style-type: none"> <li>- Organizational culture and management.</li> <li>- Knowledge.</li> <li>- Changes at market conditions.</li> <li>- Participation of workers, ideas that come from customers, suppliers, etc.</li> <li>- Environmental changes.</li> <li>- Radically innovative.</li> </ul>
Berland, 2009	Effects of foreign acquisitions on R&D activity.	<ul style="list-style-type: none"> <li>- Total R&amp;D budget.</li> <li>- Internal R&amp;D spending and their nature.</li> <li>- Financing mode of R&amp;D budget.</li> </ul>
Chen and Yang, 2009	Typology and performance of new ventures in Taiwan	<ul style="list-style-type: none"> <li>- Number of patent.</li> </ul>
David Radesjo & Anton Sandstrom, 2013	Assessing capabilities for innovation	<ul style="list-style-type: none"> <li>- Organizational structure.</li> <li>- Training and culture.</li> <li>- Innovation strategy.</li> <li>- Leadership &amp; management.</li> <li>- Communications.</li> <li>- Implementation.</li> <li>- Creativity.</li> </ul>
Elmqvist and Le Messon, P. 2009	The value of the “failed” R&D project	<ul style="list-style-type: none"> <li>- Measure the contribution of the R&amp;D projects to the innovation capabilities, from the perspective of the financial resources, strategic vision, competences and knowledge gaps.</li> </ul>
Eva Diedrichs, 2013	Developing innovation management capability	<ul style="list-style-type: none"> <li>- Innovation strategy.</li> <li>- Culture and organization.</li> <li>- Management ideas.</li> <li>- Development and improvement.</li> </ul>
Hull and Covin, 2010	Learning capability, technological parity, and innovation mode use	<ul style="list-style-type: none"> <li>- Number of new products brought to market through each mode: internal innovation, cooperative innovation, external innovation.</li> <li>- Learning capacity and technological parity.</li> <li>- Risk taking, Organicity, firm size, firm age, sales growth, ROA and current ratio and R&amp;D intensity.</li> </ul>
Kroll and Schiller, 2010	Establishing an interface between public sector applied research and the Chinese enterprise sector	<ul style="list-style-type: none"> <li>- Innovation activity.</li> <li>- Expenditures for R&amp;D.</li> <li>- Qualified workers.</li> <li>- Relationships with customers and suppliers.</li> <li>- Parent/ affiliated company.</li> <li>- Fairs/ technical markets.</li> <li>- Cooperation with other company.</li> <li>- Cooperation with university/ research institute.</li> </ul>
Yang, 2012	Innovation capability & corporate growth	<ul style="list-style-type: none"> <li>- System reward.</li> <li>- Risk taking.</li> <li>- Commitment to learning.</li> <li>- Technology.</li> <li>- Corporate growth.</li> </ul>

### **Objectives and research questions**

This study intends to determine the innovation capability level in Steel Company and through it we can find the innovative gaps in each level. The research questions are:

**Q1:** What is the level of innovation capability in steel company and what is existing gap in each level of innovation capacity in steel company relative to the desired level?

**Q2:** The developed model is proposed to mea-

sure and assess the level of innovation capability in steel industry.

### **Statistical population**

Middle managers and senior experts of the Islamic Republic of Iran Steel Company with undergraduate and graduate qualifications and experience higher than a year as an expert survey form. Population of study were specified according to the company conditions at the time (Table 2).

**Table 2: Education and work experience profile of respondents**

Education	Number	Percent	Average work experience
Bachelor	22	62.9	11
MS	8	22.9	5.5
PHD	5	14.2	5
Sum	35	100	8.8

## Results

### First question

According to data collected by questionnaire, existing level of innovation for each dimensions of

innovation capability and for the entire innovation capabilities are shown in Table 3. To determine the optimal level of innovation capabilities we found 75% during an interview with senior experts, we show the results in Table 3 and figure2 in the following.

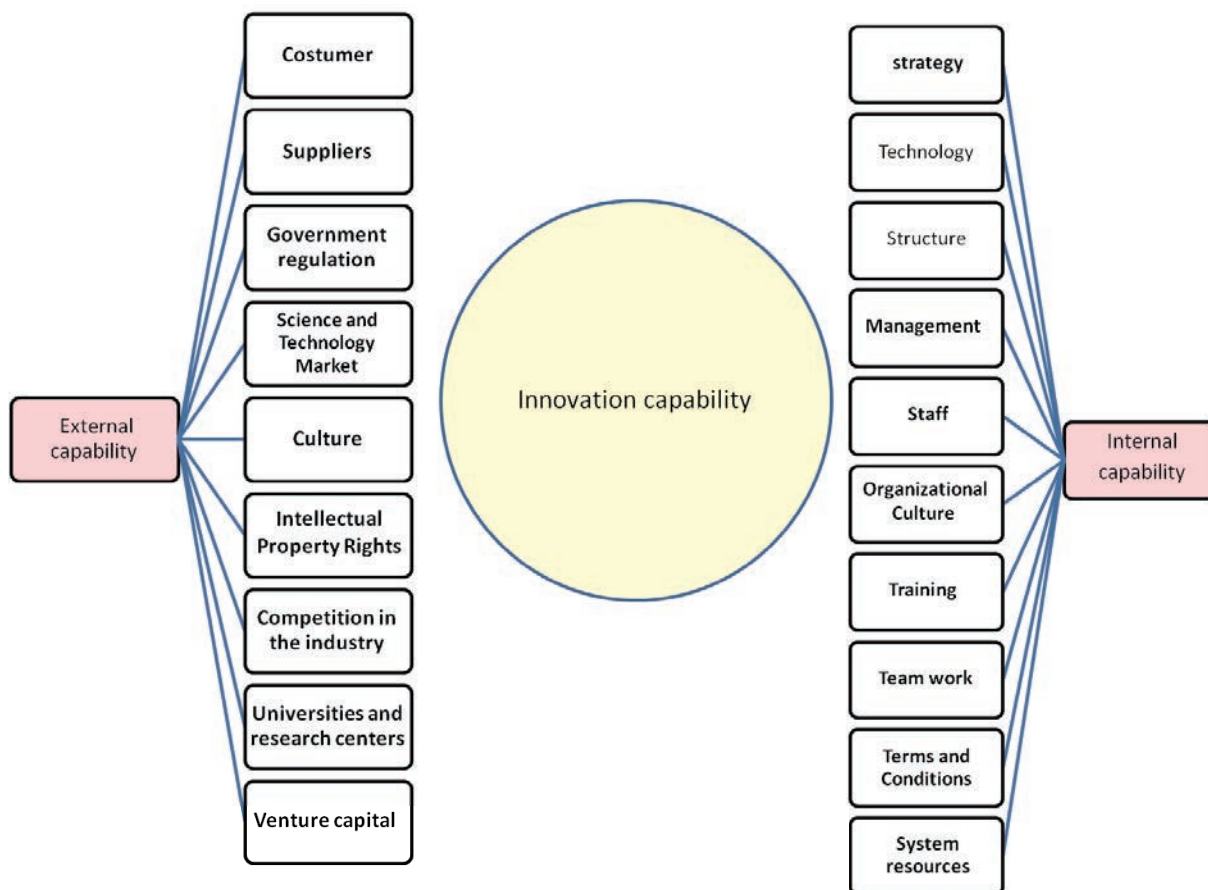
**Table3: Existing gap in comparison to the optimal level of innovation capabilities**

Dimensions	Capability mean (percent)	The gap compared to optimum level(75%)
Strategy	52.76	22.24
Structure	52.86	22.14
culture	48.43	26.57
management	44.69	30.31
Training	44.10	30.90
Team work	33.57	41.43
staff	45.93	29.07
Terms and Conditions	46.14	28.86
Innovation system	41.29	33.71
Market & external stakeholders	48.51	26.49
Organization capability	54.05	20.95
Total average of innovation capability	46.57	28.43

**Figure 2: Existing gap in comparison to the optimal level of innovation capabilities.**

### Second question

According to the literature review and the Research findings, developed model that proposed to measure and assess the level of innovation capability in steel industry is shown in fig.2. According to this model, the variables affecting innovation capabilities are shared into two categories which include: the external variables and internal variables of organization. In other words, these two variables cause the formation of innovation capabilities in the steel industry.



**Figure 3: developed model is that proposed for measure and assess the level of innovation capability in steel industry**

## Conclusion

Innovation capability assessment allows and provides to analysis the conditions and potential of any firm and comparison with situation of competitors for make strategic decisions. The innovation capability is a necessary condition for the achievement of innovation in economic company. In other words, without considering the level of innovation capability, innovation (including innovation in product / service or process) is not possible. According to the results in Table 3, dimensions of innovation capability, “structure” with a score of 52.86 percent, most capable and “teamwork” with a score of 33.57 was found to be the weakest. On the other hand, among the dimensions of innovation capability, “organizational capability” with a minimum gap of 20.95 percent compared to desire level of experts and “teamwork” with a maximum gap of 41.43 compared to desired level of expert. Since the steel industry in the world and in our country is in strategic significance, therefore, designed the model to assess the ability of innovation capability in this industry is essential for achieve the vision outlined and future

progress. So we can use this developing model at specified time periods to assess the innovation capability in this industry then with regard to the gap in each of the dimensions, define and implement an improvement project in the area of innovation, so as to realize the vision outlined and help the steel industry.

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