

## A Comparative study between National Innovation System in Switzerland and Iran

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**Abstract:** In this article, the innovation policy of one OECD country will be studied. This country has got a successful National Innovation system in Europe. This study focuses on the existing National Innovation System of Iran to analyze the conditions of Iran's NIS with paying attention to the classification based on Organization for Economic Cooperation and Development related to the national innovation system. Finally some policies for solving the problems of national innovation system of Iran will be recommended. In this research, a field research investigation through designed questionnaires, and a series of interviews with policymakers, officials, executives in the network of institutions in Iran have been implemented.

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**Keywords:** Innovation policy, institutional mapping, SWOT Analysis, OECD Countries

### 1. Introduction

The OECD is a unique forum where the governments of the 30 democracies work together to address the economic, social and environmental challenges of globalization. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The organization provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies. The Commission of the European Communities participates in the work of the OECD. We review Swiss experience because "Switzerland enjoys one of the highest levels of gross domestic product per capita in the OECD area." (OECD, 2005) Based on the results of a series of interviews with major stakeholders in Iran's innovation system, the innovation policies in Iran will be listed.

**Basic definitions:** An innovation is the implementation of a new significantly improved product (good or service), or process, a new marketing method, or a new organization in business practices, workplace organization or external relations.

This broad definition of an innovation encompasses a wide range of possible innovations. An innovation can be more narrowly categorized as the implementation of one or more types of innovations, for instance product and process innovations can be related to the definition of technological products and process innovation.

The minimum requirement for an innovation is that the product, process, marketing method or organizational method must be new (or significantly improved) to the firm. This includes products, processes and methods that firms are the first to develop and those that have been adopted from other firms or organizations.

Organizational activities are all scientific, technological, organizational, financial and commercial steps which actually, or are intended to,

lead to implementation of innovations. Some innovation activities are themselves innovative; others are not novel activities but are necessary for the implementation of innovations. Innovation activities also include R&D that is not directly related to the development of a specific innovation.

A common feature of an innovation is that it must have been implemented. A new or improved product is implemented when it is introduced on the market. New processes, marketing methods or organizational methods are implemented when they are brought into actual use in the firm's operations.

An innovation firm is one that has implemented an innovation during the period under review. (OSLO, 2006)

Different definitions of National Innovation System are explained as followed:

- "...The network of institutions in the public and private sectors, whose activities and interactions initiate, import, modify and diffuse new technologies."(Freeman, 1987)
- "... The elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge ... and are either located within or rooted inside the borders of a nation state."(Lundvall ,1988)
- "...A set of institutions whose interactions determine the innovative performance of national firms."(Nelson , 1993)
- "... The national institutions, their incentive structures and their competencies, that determine the rate and direction of technological learning (or the volume and composition of change generating activities) in a country." (Patel and Pavitt ,1994)
- "...That set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artifacts which define new technologies." (Metcalf , 1995)

## 2. Material and Methods

In order to understand innovation and national innovation systems in Switzerland and its experiences in this regard, primarily the authors have done library and internet research and studied many articles about the subject matter. In the next step a field research investigation was done through designed questionnaires, and interviews was done with the following policymakers, officials, executives and other related institutions:

- the Policy makers , innovation and technology policy coordinators like the state experts, members of the parliament, the experts in the ministry of science, researches and technology and experts in the ministry of industries and mines
- The experts of supporting organizations for research and development and innovation activities
- The experts of institutions for innovation development like Technology Parks and University Incubators
- The experts of Technological and innovation Users such as industries , SMEs, private and public corporations

## 3. Results

**3-1.Switzerland Experience**,In a research study by OECD (2006) in Switzerland, the Strengths, Weaknesses, Opportunities and Threats of the NIS have been listed to find the solutions for modifying the national innovation system of that country. Various instruments have been used, such as survey study and SWOT analysis in the layers of Government and Parliament, Ministries related by R&D, research and development, Main organizations to facilitate and support the innovation activities, Public and private R&D Centers, Technological Users. Most of the main specifications of the National Innovation System of Switzerland are as follows:<sup>[1]</sup>.

### **Strengths:**

- S1: Strong industry (large and small firms), good framework conditions
- S2: Many sectors of Swiss industry (and services) are strong in innovation, high level of industrial research
- S3: Very good university sectors
- S4: Strong research infra structure
- S5: Strong academic output (people, publication, etc.) and impact
- S6: Strong application-oriented professional

education

S7: High quality approach in all sectors

S8: Language skills and ability to master intercultural setting

#### **Weaknesses**

W1: Slow economic growth

W2: Lack of entrepreneurship and of competition in a number of sectors

W3: Lack of “demand orientation” in the innovation system

W4: Some innovation system actors are under developed, policy learning is difficult for them.

W5: Innovation issues are not strongly represented in the political arena

W6: Small number of higher education graduates; educational system is not preamble enough

#### **Threats**

T1: Decline in innovative performance after extended period of stagnation

T2: Exposure of SMEs to new international competition

T3: Public sector deficits plus rising social security costs crowding out fresh money for innovation

T4: Consensus-based policy making getting strong in innovation policy

T5: Competition between national and EU innovation funding

#### **Opportunities**

O1: construction on scientific strengths

O2: Attractiveness as a workplace for foreign experts

O3: Clustering within Switzerland and in trans-border co-operations

Based on the innovation system concept, the strategic ways extracted through SWOT model showed in table 1.

### **3-2. National Innovation System of Iran's policies**

On the results of 100 interviews with major stakeholders in Iran's innovation system, following Strengths, Weaknesses, Opportunities and Threats are listed:

#### **Strengths**

S1: There are good universities in the country at different levels

S2: Good academic outputs (Human resources graduates, and published articles ...)

S3: Providing education levels for women in all academic levels

S4: Supporting the innovation and inventors

S5: Strong national decision to develop areas of

research and innovation

S6: Fairly good university-industry relationship

#### **Weaknesses**

W1: There is not a central organization for deciding the major policy-related innovation.

W2: Despite good growth of scientific productions, there is not a comprehensive process for changing the knowledge to technology, and technology to entrepreneurship and wealth

W3: Lack of institutional coordination with the main interface elements of innovation (government, university and industry)

W4: Lack of innovation specialized consulting firms

W5: Speed and security for IT networks are not good

W6: Relatively poor access innovation users and researchers through the comprehensive information technology network

W7: The relative weakness of joint teamwork between university and industry

#### **Threats**

T1: International sanctions to transfer knowledge and new technologies

T2: Social relatively weak capacity to learn from successful and unsuccessful international experience

T3: Not providing enough facilities to keep and attract professionals, innovators and researchers, and international experts.

#### **Opportunities**

O1: Young, creative and educated people in Iran

O2: Opportunity of globalization to develop research, technology transfer and innovation

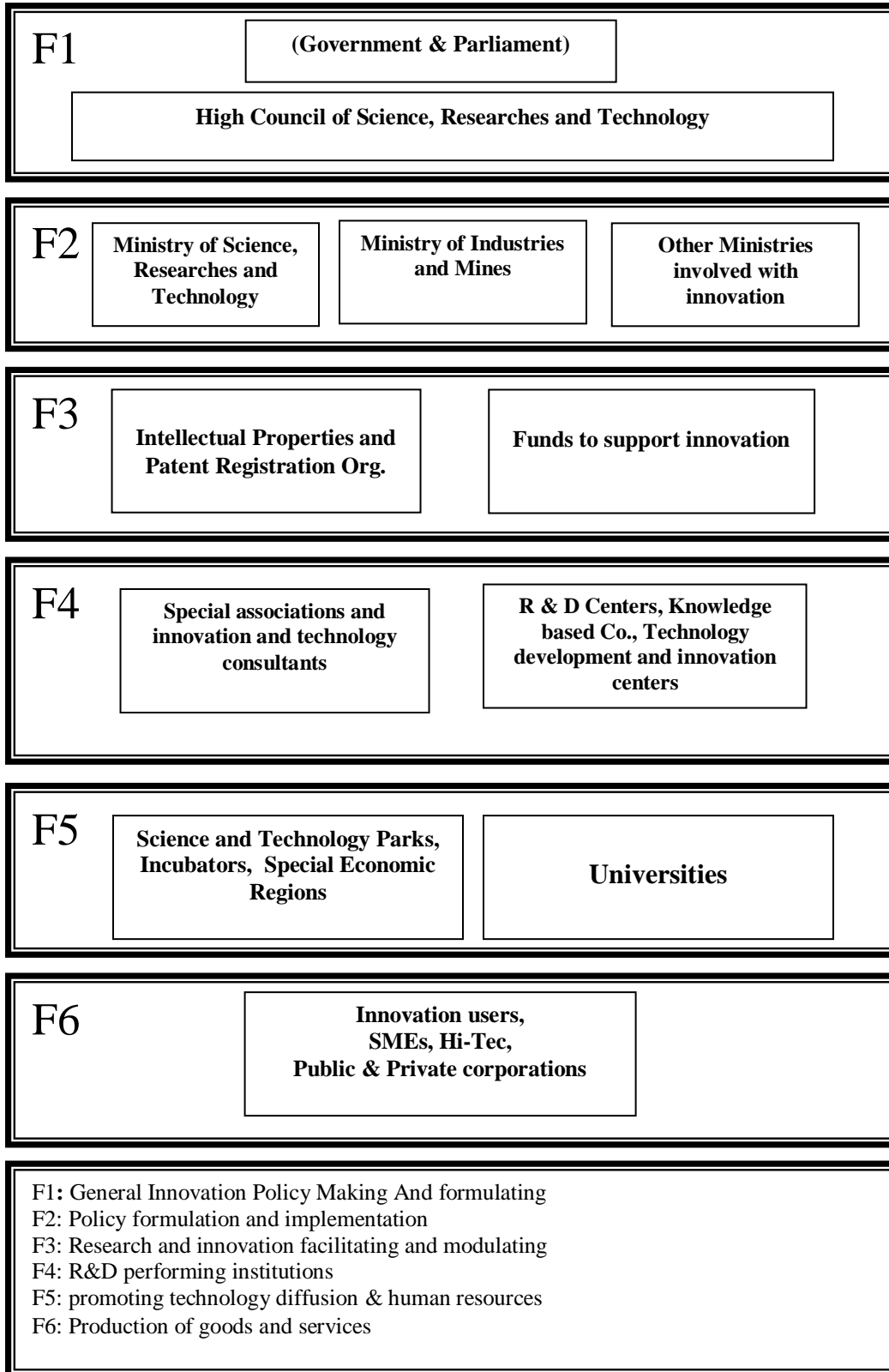
O3: Geopolitical unique situation for access to the open sea, Oman Ocean, Europe, Eastern Asia and Central Asia

O4: having the second position of oil and gas resources in the world and easy access to energy for industries

Strengths/ Weaknesses  Opportunities/ Threats	S1, S2, S3, S4, S5,S6,S7,S8	W1,W2,W3, W4,W5,W6
<b>O1</b> <b>O2</b> <b>O3</b>	1. strategic planning for innovation 2. Greater attention to policy evaluation	1.increased public R&D expenditure 2. Transition to more project-based funding in public research institutions
<b>T1</b> <b>T2</b> <b>T3</b> <b>T4</b> <b>T5</b>	1. New governance structures for innovation policy 2. Increased attention to science-industry linkages 3. Growing concern about human resources for Science and Technology	-----

**Table1.** SWOT Matrix for NIS of Switzerland

**Fig1.** Suggested Modified institutional mapping for NIS of Iran



Finally by the analysis of data collection through field research and using SWOT matrix with paying attention to the classification based on OECD (Organization for Economic Cooperation and Development) related to National Innovation System, the following strategies for improving the NIS of Iran are recommended:

3. Developing of the Skilled manpower
4. Encouraging and support the development of scientific knowledge into technical knowledge and wealth
5. Encouraging the educated women to work in the research centers and the laboratories
6. Finding specialized consulting firms for innovation, registration and marketing ideas
7. Developing large innovative SMEs network in the country
8. Improving the speed of Internet and ICT infrastructures, the development of online applications in public and private sectors
9. Creating a comprehensive information bank of researchers and innovators for easy access by innovation users
10. Facilitating and supporting all the functions of innovation
11. Expanding the culture for learning from successful and unsuccessful international experiences
12. Modifying the institutional mapping by the suggested model that is shown by Fig.1

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#### Abbreviations

**OECD:** Organisation for Economic Co-operation and Development, The OECD countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France Germany, Greece, Hungary, Iceland Ireland, Italy Japan Korea, Luxemburg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain Sweden, Switzerland, Turkey, the United

Kingdom and the United states, The commission of the European Communities takes part in the work of the OECD.

**R&D:** Research and Development

**ICT:** Information and Communication Technology

**S:** Strength

**W:** Weakness

**O:** Opportunity

**T:** Threat

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