African Journal of Business Management Vol. 5(24), pp. 10108-10116, 14 October, 2011
Available online at http://www.academicjournals.org/AJBM
DOI: 10.5897/AJBM10.1355
ISSN 1993-8233 ©2011 Academic Journals

Full Length Research Paper

Institutions and functions of national innovation system in Norway and Iran

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Accepted 21 July, 2011

In this article, the institutions and functions of the National Innovation System of Norway has been reviewed. Norway owns a successful National Innovation system in Europe and the OECD countries. This study will focus on the present National Innovation System of Iran and in this research, designed questionnaires, and a series of interviews with policymakers, officials, executives and various related national innovation system in the East of Iran were used as mean of investigation. In this article, the Institutional Function Matrix of Iran will be presented as a tool of national innovation system and the strategic recommendations will be extracted through strengths-weaknesses-opportunities and threats (SWOT) model to suggest the strategic solution for improving the National Innovation System of Iran.

Key words: Organization for Economic Cooperation and Development (OECD), National Innovation System (NIS), institutional function matrix, strengths-weaknesses-opportunities and threats (SWOT) model, Iran.

INTRODUCTION

Innovation is a powerful force for sustainable economic growth. Innovation is closely linked with economic growth and productivity gains. Strengthening the conceptual and empirical links between innovation and economic performance is a primary objective of the innovation strategy. In recent years, national innovation system (NIS) is accepted as a conceptual framework and analytical instrument for countries' innovation activities by the international organizations such as Organization for Economic Cooperation and Development (OECD), United Nations Conference on Trade and Development (UNCTAD) and Euro stat.

The NIS is the flow of technology and information among people, enterprises and institutions which is the key to the innovative process on the national level. According to innovation system theory, innovation and technology development are results of a complex set of relationships among actors in the system, which includes enterprises, universities and government research institutes. A national system of innovation has been defined as follows:

1) "The network of institutions in the public and private sectors, whose activities and interactions initiate, import, modify and diffuse new technologies" (Freeman, 1995).
2) "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, 1992).
3) "A set of institutions whose interactions determine the innovative performance ... of national firms" (Nelson, 1993).
4) "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).
5) "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

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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" (Metcalfe, 1995).

The system components of a technological innovation system are called structures. These represent the static aspect of the system, as they are relatively stable over time. Three basic categories are distinguished:

1) Actors: Actors involve organizations contributing to a technology, as a developer or adopter, or indirectly as a regulator, financer, etc. It is the actors of a technological innovation system that, through choices and actions, actually generate, diffuse and utilize technologies. The potential variety of relevant actors is enormous, ranging from private actors to public actors and from technology developers to technology adopters. The development of a technological innovation system will depend on the interrelations between all these actors. For example, entrepreneurs are unlikely to start investing in their businesses if governments are unwilling to support them financially. Vice versa, governments have no clue where financial support is necessary if entrepreneurs do not provide them with the information and the arguments they need to legitimate policy support.

2) Institutions: Most authors agree that institutional structures are at the core of the innovation system concept, like Edquist , Johnson and North. It is common to consider institutions as 'the rules of the game in a society. A distinction can be made between formal institutions and informal institutions, with formal institutions being the rules that are codified and enforced by some authority, and informal institutions being more tacit and organically shaped by the collective interaction of actors. Informal institutions can be normative or cognitive. "The normative rules are social norms and values with moral significance, whereas cognitive rules can be regarded as collective mind frames, or social paradigms" (Scott, 2001).
Examples of formal institutions are government laws and policy decisions; firm directives or contracts also belong to this category. An example of a normative rule is the responsibility felt by a company to prevent or clean up waste. Examples of cognitive rules are search heuristics or problem-solving routines. They also involve dominant visions and expectations held by the actors (Edquist and Johnson, 1997; North,1990;).

3) Technological factors: Technological structures consist of artifacts and the technological infrastructures in which they are integrated. They also involve the techno-economic workings of such artifacts, including costs, safety, reliability. These features are crucial for understanding the feedback mechanisms between technological change and institutional change. For example, if research and development (R&D) subsidy schemes supporting technology development should result in improvements with regard to the safety and reliability of applications, this would pave the way for more elaborate support schemes, including practical demonstrations. These may, in turn, benefit technological improvements even more. It should, however, be noted here that the importance of technological features has often been neglected by scholars (Suurs, 2009).

The structural factors are merely the elements that make up the system. In an actual system, these factors are all linked to each other. If they form dense configurations they are called networks. An example would be a coalition of firms jointly working on the application of a fuel cell, guided by a set of problem-solving routines and supported by a subsidy programmer. Likewise, industry associations, research communities, policy networks, user-supplier relations, etc. are all examples of networks.

METHODOLOGY

As the first step, in order to understand innovation and national innovation systems in Norway and its efforts in this regard, the authors went trough library resources, articles and Internet information network about the subject, based on OECD research class category. As the second step, the authors have done a field research investigation through designed questionnaires, and interviews with the following peoples:

1) Policy makers, innovation and technology policies coordinators such as state experts, parliament, the experts in ministry of science, researches and technology and ministry of industries and mines;
2) The experts of supporting organizations for research and development and innovation activities;
3) The experts of institutions for development of innovation such as technology parks and university incubators;
4) The experts of Technological and innovation Users such as industries, SMEs, private and public corporations.

In this research, the institutional function matrix of Iran, as a tool of national innovation system will be presented and the strategic recommendations that suggest the strategic solution for improving the National Innovation System of Iran will be delivered from the SWOT model.

Norwegian experience

Here, the main organizations related to the Norwegian Innovation System and their interrelations are introduced. These conclusions resulted from studies done in Norway by OECD in 1998. In organizational map of NIS of Norway, 6 levels are distinguished:

1. Institutions laying down the general policy framework;
2. Technology and innovation policy formulating institutions (including financing, co-ordination, supervision and assessment);
3. Research and innovation facilitating and modulating institutions;
4. R&D performing institutions;
5. Institutions promoting technology diffusion; and
6. Goods and service producers.

Institutions defining the general policy framework

The system of government

The apex of organizational pyramid, is the Norwegian government system. In the starting (parliament), the day to day business is handled by party groups and in the committee system.

The parliamentary committees dealing most directly with innovation policy issues are:

1. The Committee on Education, Research and Church Affairs;
2. The Committee on Business and Industry;
3. The Committee on Energy and the Environment; and
4. The Committee on Finance and Economic Affairs.

As a result of the sector oriented division of committees, research and innovation policy issues are dealt with in several committees. The Committee on Finance and Economic Affairs has an overall responsibility for economic policy, but only indirectly impact on the innovation system as it deals with businesses related to general economic policy, public finances and credit policy, taxes etc. The Committee on Education, Research and Church Affairs has a particularly important role as it handles the budget for education and research including research related to agriculture, fisheries and industry. The Committee on Energy and the Environment handles oil and energy businesses; the Committee on Business and Industry handles businesses related to industry and business, but also fisheries, agriculture, subsides of shipbuilding and tourism is the concern of this committee. Both of these committees handle matters of importance for innovative performance, like funding of the Norwegian industrial and regional development fund (business and industry).

High level research policy committees

At Governmental level however, there are two high level committees focusing on science and technology policy related issues: the inter-ministerial research forum (DFU) and the governmental research commission (RFU). The DFU is an inter-ministerial committee with regular meetings at administrative level. Its primary function is to support the ministry of Church Affairs, Education and Research policies. The RFU is a commission of government ministers, appointed by the Government and headed by the minister of Church Affairs, Education and Research. Its term of reference is to advice the government on R&D policies and decisions, but in practice its main function has been in the setting of annual R&D budgets.

The ministries

In a general sense, all the ministries have a direct or indirect impact on the Norwegian system of innovation. However, measured in terms of funding of industrially related R&D and innovation, the Ministry of Education, Research and Church Affairs (KUF), the Ministry for Trade and Industry (NHD) and the Ministry of Regional Affairs and Labour Relations (KAD) are the largest ones.

The KUF and its affiliated institutions make up a major component in the R&D related innovation policy system. The main axes of this component are the Norwegian Research Council, founding both basic and applied research, and the higher education institutions (HEI). In addition to R&D funding, KUF has responsibility for the overall organization of the research system, a prime dimension of which is the general funding principles and policies towards the large sector of autonomous contract research institutions. From the innovation policy perspective, this gives concerns mostly to the industrial and technological research institutes.

The Ministry of Trade and industry has a wide impact on the Norwegian system of innovation. Its areas of responsibility covers:

1. Legal issues related to industry, trade, foreign ownership and immaterial property rights;
2. Industry and trade policy issues related to the structure of industries, to public financing and venture capital for industry, small and medium sized businesses, export credits and guarantees, and to the handling of government ownership in joint-stock firms;
3. Loans, warrants and funds for financing industrial development at firm and industry level;
4. Co-ordination of industrial policies with policy making in European Union (EU), European Economic Area (EEA), World Trade Organisation (WTO) and OECD, and bilateral technology and industrial co-operation with other countries;
5. R&D policy, including founding of Research Council of Norway (NFR), space research, ship research, public procurement and public R&D contracts;
6. The public advisory services; and
7. Administrative responsibility for standards setting agencies, ship control, shipping registers, the Norwegian patent office and for mining related exploratory and regulatory bodies.

The Ministry of Petroleum and Energy has had great influence on offshore related technical research in Norway, and on innovation capabilities of the related industries, through criteria used for giving concessions for oil exploration to foreign and national firms. The efforts have led to very significant investments being made by private firms in offshore related R&D in Norway.

The KAD has played a role in formulating regionally oriented industrial and innovation policies, and is playing an active role promoting regional innovation capacities.

Its main role as a provider for funds for innovation related activities is as a sponsor of the Norwegian industrial and regional development fund (SND). The ministry also supports the establishment of science parks. These budget allocations are all positioned within the framework of Norwegian policies for regional development.

Institutions which formulate technology and innovation policies, and implement policy by financing, coordinating, supervising and assessing innovation efforts

The NFR, identifies important fields of research, allocates funds and evaluates R&D. It is also called upon to offer strategic advice to the government on science and technology issues. NFR takes responsibility for resource allocations in six sub-areas: natural science and technology, medicine and health, industry and energy, culture and society, bio-processing and environment and development.

The SND, also established in 1993 as a reorganization of previously existing institution, is now the central institution for public funding of industrial and regional development in Norway. Its main supporters, the Ministry of Trade and Industry and the Ministry of Regional Affairs and Labour Relations, provide the general financing of SND is main instruments.

These include grants for innovation related activities, loans for such activities and for other 'change-generating' activities like development and acquisitions of new capital goods, warranties that enable firms to get loans from private financial institutions, and a general venture fund. And there are other public funds, banks, etc. (Hauknes, 1995).

Research and innovation facilitating and modulating institutions

There is a formal system of standards that sets the framework within which innovation can occur, or which innovators have to change in order for the innovation to be successful. This system is partly national, but to an increasing extent international. Norwegian Standards Association (NAS) covers the fields of general standards NAS, construction (NBR), electrotechnics (NEK), technology (NTS) and post and telecommunication (PT).

A special bureau has been set up to take care of standards relating to measurement and controlling measurement equipment in practical use (Justervesent). This institution also certifies laboratories that are able and qualified to certify products and institutions according to different standards.

Municipalities and county councils have traditionally played an important role for business development by way of infrastructure building and maintenance, and by providing public services in general.

The national library services, and the library services at the universities, are independently funded. With the advent of electronic database, CD ROMs and online systems, a flora of data-base and access systems have been built up beside the libraries.

Research and development (R&D) performing institutions

The Norwegian R&D performing system is a tripartite system; with corporate R&D accounting for about 46% of national R&D performance, HEI institutions accounting for about 26% and a conglomerate sector of public and private contract R&D institutions with 23% (other institutions performing R&D account for the remaining 5%) (Statistik, 1996).

In Norway, the universities have by their institutional size and weight considerable impact on the actual science and technology policy as it is implemented. To coordinate activities the universities have established a common council, the Norwegian council of universities, which aims to

1. Develop strategies for the Norwegian system of higher education and research;
2. Improve the national coordination in the educational and research sector; and
3. Serve as a common instrument for the member institutions in their international cooperation.

In addition there are 26 state colleges, offering education and carrying out research and development mainly within the fields of engineering, administration, health care, social sciences and education.

The research institute sector is significant in Norway, and a significant part of it used to be placed under the authority of various research councils. In financial terms, corporate R&D makes up approximately one half of the total R&D effort in Norway. In terms of the undertaking innovation projects and realizing innovation, it is the goods and services producing sectors which play the commanding role.

Institutions promoting technology diffusion

There are seven science parks in Norway and a number of business parks. In science parks private businesses and university research share the same physical premises. Business parks are more oriented towards physical facilities for localization and operation of business firms, but do in practice contribute to creating industrial milieus where technology diffusion and cooperation is likely.

Selskapet for industrivekst (SIVA) is controlled by the Ministry for Local Government and Labour, and is oriented towards developing new and profitable industrial activities regionally, by being a catalyst and an investor. SIVA has invested in a number of business parks in Norway.

The National Institutes of Technology (TI) is a private foundation with approximately 270 employees. TI receives public support in order to be able to offer small and medium sized enterprises relevant expertise to improve company know-how, productivity and profitability. TI offers consultancy and development services, training, expertise and technology, environment and safety technology, business development and internationalization.

The Advisory Institute in Northern Norway (VINN) is a consultancy institute, organized as a private foundation and receiving public support for parts of its activity. The foundation offer services within several technical and economical/administrative areas. The purpose is to improve the competitive strength of companies through increased productivity, improved profitability, stronger market orientation and profitable environmental and quality management measures. In addition, VINN offers an extensive information service to the businesses.

The Norwegian Ministry of Trade and Industry buy advisory services in the fields of technology transfer and dissemination from VINN (Hauknes, 1995). Functional institutional matrix of Norwegian NIS based on mentioned information is shown in Table 1.

National innovation system (NIS) of Iran's conditions

"Goals and obstacles to innovation differ according to their types. For example, the purpose of innovation in product innovation and marketing in the first place depends on the demand (for example, improved product quality, increase market share, entering new markets), while in the process of innovation and organizational innovation depends on the supply (for example, reduced costs, improved production capabilities). Some barriers have related to all kinds of innovations, such as cost factors. While other obstacles are related to a subset of types of innovations" (Oslo Manual, 2005).

A comparative study about science and technology policy in 50 countries across five continents in the world in 2001 shows that all these countries, creating the foundation of the knowledge society as one of the most important goals of its vision to around 2020 and have chosen (Strategic document of Iran for 2025 perspective that was approved in 2004 AD, the same base is selected as the key objective) (Haj Hosseini, 2005).

The first characteristic of the attitude to science foundation (endogenous production of knowledge), refer to the country's indicators of science and technology. It can be said that knowledge production capabilities in recent years has been significantly improved. The index of scientific papers during 1995 and 2005 shows a growth of 123% that is very impressive, but unfortunately, the production index of technological knowledge (patent registered) seems weak. In the national innovation system of Iran, the ability to convert scientific knowledge to technical knowledge (science into technology) is ignored (Iran culture organization, 2009).

More importantly, the knowledge economy index basis (KEI) shows the effective utilization of economic development in the community , and especially helps us to respect the country's potential ability to create innovation (converting knowledge to wealth) during the 2007 World Bank assessment, our country among 137 countries ranked 98th, while the Vietnam, Azerbaijan, Lebanon are ranked 66th, Jordan (ranked 62nd), Bahrain (ranked 52nd) and Qatar (ranked 42nd) (Iran culture organization, 2009).

Table 1. Functional institutional matrix of Norwegian NIS.

Institution/Function	Parliament, Cabinet, Ministries	Regulatory, standards certifying	NFR	SND	TI, VINN, BRT	Other public funds, banks etc	SVO	Patent	Universities, higher education	R&D institutes	Corp. R&D	Libraries databases	Commercial Banks, Venture capital	Private consultancy firms	Industry and professional. association	Science and Business Parks
-Technology and innovation policy formulation and coordination	x	x	x	x					x	x						
-Supervision and assessment		x	x	x	x		x	x	x	x					x	
Performing R&D					x				x	x	x			x		
Financing R&D	x		x	x		x					x		x			
Promotion of human resource development and mobility			x	x	x		x		x	x				x	x	x
Technology diffusion -			x	x	x	x	x	x	x	x				x	x	x
Promotion of technological entrepreneurship		x	x	x		x	x	x	x	x	x		x			x
Publicity available information	x	x	x	x	x		x	x	x	x		x			x	x
Standards and regulation	x	x						x								x
Other physical infrastructure	x	x		x								x				

The study and the analysis of national innovation system are done by different tools, and the institutional mapping is the most common one. In the same way in 2005, a study by the organization studies, the UNCTAD with local experts and relevant internal review, and its strengths and weaknesses was identified and described. The first and most successful subject in the country in the last decade can be a focus of national innovation system and entering the words of innovation to the literature of country and

doing some activities by science and technology organization.

The most important steps toward creating a national system of innovation that was performed in Iran, were establishing the Ministry of Science, Research and Technology, establishing the Supreme Council of Science, Research and Technology, development of science and technology parks in provinces, establishing Technology Park Campus, increasing the number of small and medium scale enterprise (SME) growth and development centers.

"Important organizations in the national system of innovation include: entrepreneurs, universities, organizations, investors, government agencies related to innovation and competitive policies, laboratories and research centers" (Manteghi, 2001).

As mentioned, the national innovation system included the elements (organizations) and institutions as follows,

Elements include:

1. Strategic elements of policy regime;
2. Elements of education, R&D of human resources; and
3. Infrastructure elements, including intermediate and basic infrastructure and hardware, entrepreneurship, finance, international cooperation and other elements of national.

And the institutions are:

1. Customs official (including laws and regulations); and
2. Norm of non-formal (including culture and social capital).

In developing countries, including Iran the following factors should be studied:

Systematic factors such as lack of decisiveness macroeconomic, low volatility, lack of physical infrastructure (electricity and basic services such as fast and reliable information and communication technology), fragility norm, the lack of social awareness about the innovation, the nature of the possible risk of disagreement entrepreneur, the lack of entrepreneurship, despite the barriers set up at the start of business, lack of public policy tools to support business and management education (OECD, 2005).

Regarding on vision and strategy for 2025, Iran should be as a knowledge-based society (knowledge basis), the first advanced level in the region is discussed and the following bases for the Fifth Five Year Plan (2010-2014) in innovation has been chosen:

1. Allocate 3% of gross domestic product (GDP) to research and innovation;
2. Annual growth rate of 20 percent in postgraduate;
3. Gaining the second scientific-economic rank in the West Asia till the fifth five-years developing plan (2010-2014) of Iran;
4. Establishing an effective relation between universities, R&D centers and industry;
5. Accessing to advanced industries needed;
6. Supporting the inventors and innovation; and
7. Developing and reforming the comprehensive scientific road map (Fifth Five Years Developing Governmental Plan of Iran for 2010-2014, 2009).

RESULTS

On the results of a series of interviews by authors through designed questionnaires with major stakeholders in Khorasan State of the East of Iran (more than 100 sessions), the institutions and functions as shown in Table 2 were listed. The strengths, weaknesses, opportunities and threats were analyzed in SWOT (Table 3).

The most important of Strengths, weaknesses, opportunities and threats are followed:

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 no central organization for deciding on the major policy-related innovations.
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 of 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: Relatively weak social capacity to learn from successful and unsuccessful international experience.
T3: Adequate facilities were not provided for maintaining and attracting experts, researchers and innovators.

Opportunities

O1: Young, creative and educated people in Iran.
O2: Opportunity of globalization to develop research, technology transfer and innovation.

Table 2. Institutional functions matrix of the national innovation system of Iran.

Functions/Institutions	Policy	Legal and financial facilities and support coordinators	Security Knowledge Innovation	Promote technological entrepreneurship	Disseminating and developing technology	Development and promotion of human resources	Production of goods and services
Deemed Council	√						
Government	√						
Parliament	√						
Council of Cultural Revolution	√						
Council of Science, Research and Technology	√	√					
Ministry of Science		√					
Ministry of Industry		√					
Other relevant ministries		√					
Funds to support innovation and elite		√					
Universities			√			√	
Science and Technology Park			√	√	√		
R&D Centers			√	√	√		
Technology Development and Innovation Centers			√	√	√		
Professional associations, consultants, innovation and technology transfer			√		√		
Innovation users, SME, Hi-Tec ,…				√			√

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.

Now, by using the SWOT matrix analysis that is shown in Table 2, the necessary strategies will be extracted to reinforce strengths, using opportunities, reduce the weaknesses and minimize the threats. So, far from what can be discussed, the Institutional-functions matrix of the national innovation system of Iran is shown in Table 2.

CONCLUSION AND DISCUSSION

Finally, by data collection and analysis through field research via interview with policymakers, officials, executives and various related national innovation system based on questionnaires designed, and then using SWOT matrix model with paying attention to 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:

1. To develop the skilled manpower,

Table 3. SWOT matrix analysis for NIS of Iran.

Strengths-Weaknesses/Opportunities-Threats	S1,S2,S3,S4.S5	W1,W2,W3,W4,W5,W6,W7
O1, O2, O3, O4	1. To develop the skilled manpower more investment in R&D and innovation, especially in the private sector 2. To invest more in R&D and innovation, especially in the private sector 3. To encourage and support the development of scientific knowledge and convert it to technical knowledge and wealth 4. To encourage the educated women to work in research centers and laboratories	1. To establish the central organization for major policy-related innovation 2. To evolve of the University mission, industry and government as the main actors of national innovation system 3. To establish the specialized consulting firms for innovation, registration and marketing ideas 4. To develop the large innovative SMEs network of country 5. To improve the speed Internet and ICT infrastructures, the development of online applications in public and private sectors 6. To create a comprehensive information bank of researchers and innovators for easy access by innovation users
T1, T2, T3	1. To strengthen the cooperation between universities and industries 2. To provide enough encouragements to attract professionals, innovators and researchers 3. To facilitate and support all the functions of innovation	1. To develop the international cooperation for promoting technology and innovation transfer 2. To expand of culture for learning from successful and unsuccessful international experiences 3. To learn from successful national innovation system

2. To invest more in R&D and innovation, especially in the private sector,
3. To encourage and support the development of scientific knowledge and convert it to technical knowledge and wealth,
4. To encourage the educated women to work in research centers and laboratories,
5. To establish the central organization for major policy-related innovation,
6. To evolve of the University mission, industry and government as the main actors of national innovation system,
7. To establish the specialized consulting firms for innovation, registration and marketing ideas,
8. To develop the large innovative SMEs network of country,
9. To improve the speed Internet and information and communication technology (ICT) infrastructures, the development of online applications in public and private sectors,
10. To create a comprehensive information bank of researchers and innovators for easy access by innovation users,
11. To strengthen the cooperation between universities and industries,
12. To provide enough encouragements to attract professionals, innovators and researchers,
13. To facilitate and support all the functions of innovation,
14. To develop the international cooperation for promoting technology and innovation transfer,
15. To expand of culture for learning from successful and unsuccessful international experiences,
16. To learn from successful national innovation system,
17. To improve the speed Internet and information and communication technology (ICT) infrastructures, the development of online applications in public and private sectors,
18. To create a comprehensive information bank

of researchers and innovators for easy access by innovation users,
19. To strengthen the cooperation between universities and industries,
20. To provide enough encouragements to attract professionals, innovators and researchers,
21. To facilitate and support all the functions of innovation,
22. To develop the international cooperation for promoting technology and innovation transfer,
23. To expand of culture for learning from successful and unsuccessful international experiences, and
24. To learn from successful national innovation system.

Abbreviations: DFU, inter-ministerial research forum; **RFU,** governmental research commission; **KUF,** Research and Church Affairs; **NHD,** Ministry for Trade and Industry; **KAD,** Ministry of Regional Affairs and Labour Relations; **HEI,** higher education institutions; **KAD,** Ministry of Regional affairs and Labour Relations; **SND,** Norwegian industrial and regional development fund; **TI,** National Institutes of Technology; **VINN,** Advisory Institute in Northern Norway; **NIS,** national innovation system; **KEI,** knowledge economy index basis; **UNCTAD,** United Nations Conference on Trade and Development; **SME,** small and medium scale enterprise; **SIVA,** Selskapet for industrivekst; **EEA,** European Economic Area; **WTO,** World Trade Organisation; **EU,** European Union; **NBR,** construction; **NEK,** electrotechnics; **NTS,** technology; **PT,** post and telecommunication; **GDP,** gross domestic product; **NAS,** Norwegian Standards Association; **SWOT,** strengths-weaknesses-opportunities and threats.

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