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Overview of the Japanese Innovation Systems vs. the American Innovation System

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Abstract

This paper presents an overview of the Japanese national innovation systems, with comparison with a United States innovation system. Current innovation systems in Japan and the United States are in a position of transition. The key drivers behind the adaptation process are forming one hand, globalization of economies and from the other hand, sustainable development.

The analysis indicates that in the history of both systems there is an obvious trend to learn from common whether success or failures. Therefore, the differences between the systems observed in previous decades are nowadays less evident.

Thus, the transition process in both systems is leaded by concerted national actions. However, the transition in Japan, currently in a more progressive stage, shows a superior "systemic approach" guided by comprehensive plans, effective government policy reforms and roadmaps for medium and long-term strategies.

As an important reflection from this analysis we consider that from a systemic perspective, models of collaboration are less relevant that the benefit implicit in the simple action of collaborating.

Keywords: Economic development; Innovation; Development policy; Government policy; Comparative studies

Introduction

Until the late 1970s, all industrial countries repeat this creed "whoever invents or discovers that makes science and where it's, and most important is that which ensures the development of this invention, which can build new products, manufacture and markets, so the power remains in innovations and not the invention.

As Jean Claude Thivolle points on in his contribution, Japan has been long time seen as little investment in basic research, instead of the state in funding is low and businesses relying essentially on the discoveries made in abroad to conduct business research and development [1,2].

In 1945, the fundamental knowledge scientists are imported from the United States, in other words basic research was done in the United States and the development was in Japan, that's why Japanese research was precisely in the development industrial technology that's to say, the practice of the invention and its industrial development.

This industrial innovation policy to state since the 1960s an unexpected level of performance, where no rivalry in the world including the United States, where Japan was the innovation leader at that time.

Since the 1980s and especially 1990, Japan aims to establish a clean basic research system itself adapted to its social and economic system whose main purpose is the creation of the bases, the foundations for economic development and autonomous social and long term [3].

Several reasons have pushed Japan has developed its own strategy in research and developments (R&D) are cited some reasons: first reason is the energy crisis (oil crisis), rising commodity prices and its potential scarcity, have shaken the foundations of Japan, recalling that Japan is a country natural resources. On the other hand, we have the geopolitical situation of Japan between China and the United States to encourage investment in research and development.

The structured of this paper is as follows: We will present the innovation system of the Japan, we will compare the most famous innovation systems in the world the Japan and the USA.

Japanese Innovation System

The innovation system has undergone significant changes since early 1980s, or in other words, since the beginning of the macro crisis-long term economic nations that is emerging recently. This period marks the end and the beginning of two different systems of innovations.

First is based on the integration of large enterprises self R&D oriented in particular excel process of innovation and development of related product.

Second a system derived from specific scientific and technological developments in Japan focusing on the creation of a "national innovation ecosystem" as a functional part of a larger "ecosystem of global innovation". Japanese vision of an ecosystem of innovation that seeks integration scale of all agents involved in the innovation process [4].

This new approach is a response to the need to create an online innovation system with the dynamics of globalization and the challenges of sustainable development. The main pillar of this transition was the transformation of the entire university structure and research and adaptation of public administration to the new policies of science and technology (S&T).

Japanese SNI is characterized by this portion the largest sand the contribution of strong economic growth despite the lack of resources, space and energy. Thus, Japan has set up an innovation system based on "alternative energy technology" or energy efficiency that focusing on production efficiency and increasing productivity [5,6].

Japan is a knowledge society

Policy is adapted according to the obstacles encountered since the 1980s, the development of a policy of increasing investment in research which will be accompanied in the 1990 institutional reforms to promote the production and dissemination of knowledge.

The development focused on the research, the goal is to reach a stage where the Japanese search feeds the development of Japan. The post-informational would be a "knowledge society". It's therefore to organize large-scale Japanese version of type called basic research.

The policy followed is to produce long-term core technologies, create new structures for large-scale production of knowledge, to extract innovation quickly absorbed by the industrial system as new products [7].

This large-scale research policy developed in the mid-1990s involved in the transition from the social and economic model of post-war to a new model, a type of long-term sustainable clean Japan, its history and its people, to its geopolitical and ecology. To be successful, so that research becomes the highlight of the social and economic system, the policies must be accompanied by a reform of the institutional environment of research.

The institutional reforms

Reform of the ministries in charge of research: Research and development budgets are divided into two major departments that are considered reverse of the same process of production and distribution of knowledge, these two departments are the core of the state, the distinction between them is based on the distinction between the knowledge base and the industrial technology that meets the needs.

MEXT: Ministry of education, culture, sports, science and technology. It receives 63%of science and technology budgets.

METI: Ministry of economy, trade and industry former MITI) which has 17% of research budgets.

Other departments are therefore divided the remaining 20%, mainly the ministry of health, labor and welfare (4%) and the ministry of agriculture, forestry and fisheries (3%).

The role of universities

Actions have been taken since the1980s to bring more flexibility and dynamism of academic and research organization.

In the 1991, the amendment of university establishment standard (WUAS) deregulation began universities ending the strategy in the years after the war where the main function of universities was to train engineers and scientists who control the state research in the world and to train students who are only capable of either taken the notes or to become engineers in the industry [8].

A major reform of national universities was taken through a decree that turned into independent administration agencies. From then on, universities and research institution have gained greater autonomy with greater managerial decision making.

The new academic structure and research in Japan was an important incentive for improving the collaboration between universities and businesses, where the opening of the industry has become an obligation for universities as a necessity.

The role of the government

The implementation of project to reform the management of research aims to change the balancing of economic sectors and of Japanese society by giving the way to research that has become a national priority.

Major changes have been made such as the strengthening of the prime Minister's coordinating powers, the creation of councils in key areas such as S&T and reducing the number of departments and interim bodies.

The current R&D policy of the government is to double the amount of funding disturbed competitive research funds on the basis of consecutive periods of five years. Another idea in the competitive funding of the industry are also eligible for research grants.

Besides, according to the OECD 2012/2013, in the context of human resources, the government invested in learning throughout life by improving the university's equipment's for all of Japan, promoting training specialized institutions and strengthening the framework of qualifications and equivalencies [9,10].

As a complementary action, the government in coordination with academic and industry representatives developed detailed roadmaps to facilitate the proper implementation of basic S&T plans, medium and long-term strategies.

Intellectual property

In Japan, any administration, MITI, was responsible for managing the distribution of knowledge. The situation changes in the system of scientific and technical production in Japan since Japan relocating massively in East Asia and transfers knowledge which he must manage the property. This development is summarized in the basic law on intellectual property (Basic law on intellectual property) of 2002 [11].

Under this Law, Article1 shows that the problem is not just legal it concerns the distribution of knowledge in a society and in the world.

"The purpose of this law is to build an economy and dynamic society based on creating added value by creating new intellectual property and the effective exploitation of such intellectual property in light of the growing need to increase international competitiveness of Japanese industry in response to changes social and economic situation at home and abroad in order to clarify the responsibilities of the state, local government, universities and businesses".

Consequences of reforms

According to the OECD reports and data, It's noted that Japan is devoting considerable share of its budget for R&D, compared to some competitors (Annex N(1)).

Japan ranks second place in the world after the United States in terms of number of articles published internationally at a rate of 9.6% of the total number of research that have been published worldwide, representing approximately 781000 scientific articles in 2004, according to the bulletin of national science indicators published by the center for scientific information (ISI) in the United States (Annex N(1)) [12].

Japan comes second in 2006 in terms of number of patents for the record number of 409 000 application for registration after the United States, the number is 426 000 applications for registration, and after it is Japan, which occupied the first rank number 400000 application for registrations patents which represents about 80% against only 50% in the US, which has the largest number of patents foreigners (about 39%) (Annex N(1)) [13,14].

Regarding the high-tech industries and defines the five core industries that require high technology, namely: space and aviation, IT and electronics industries including communication equipment and pharmaceutical and medical industry, scientific devices, these industries require huge investments in research and development techniques and requires the production, is the percentage of participation of states in industries high technology in the world is an indicator that reflects the extent of the evolution of science and technology on the one hand, and also reflects the overall competitiveness of each country.

In 2005, Japanese income of high-tech industries revenue is 16.1% total global sales and therefore Japan ranked in second place after the United States, which generated revenues of about 35% of total revenue for the high-tech industry, while China's revenue is about 16% after Japan and here we begin to fear the decline of the Japanese competitive superiority in Asia with the emergence of technological capabilities high in some countries such as China, South Korea and Taiwan in the fields of information and to measure communication technology that could challenge Japan (Annex N(1)) [15].

The United States has the largest number of PhD's in science and engineering in the world and has reached 27 974 doctorate in 2005, and came after China with a doctorate 14 858 number, this is almost double the number in Japan, which stood at 7912 doctorate in the fields of science and engineering in 2005, citing exceed 10.3% while the ratio between the number of foreigners who obtained a doctorate in science and engineering in 2005 in the United States about 42% of the total marks this year (Annex N(1)).

Comparison: USA vs. Japan

American innovation system

The US innovation system is often characterized as a structure with high mobility of human resources, strong competitiveness, high capacity network of companies, high risk and capital risk investment, academic excellence.

This form of organization is perfectly suited innovation in the information technology sector, the model "Silicon Valley" as the main example, but most of these features are also seen in other sectors such as industry biotechnology. During the last decade, the United States innovation system is now facing criticism about its real capacity to increase and support innovation in a globalization economy [16].

The economic slowdown in the United States motivated the development of a different paradigm of innovation as has happened in Japan the dominate concept is "innovation ecosystem".

The difference between the both systems

According to some economic studies Japan has lagged behind the United States in terms of its ability to have an efficient innovation system long term. This delay may conclude it or have in several aspects such as:

a) At the level of the historical development of each of the actors involved in the innovation system: Japan is considered as the appearance of bitter our studies that the court years Japan always apply several reforms that are important for universities and public administration which are based on historical and critical changes in their performance [17,18].

However, the state has put more effective strategy than Japan, implementation of programs to improve the performance of their role by actor SBIR program is a very effective response to the necessity encourages the role of small businesses as part of a strategy that emphasizes the historical role of individual entrepreneurship in the country's previous economic success.

b) In search level: The role of universities is very low because their research is applied only internally but the overall business R&D in the large companies have been guided by the government. The United States are considered the universities as a search engine and innovation [19,20].

c) At the level of collaborations between actors (formal and informal): Collaboration between universities and industry is still exists but in the privileged framework of informal collaboration and the latter exists only in years. But in the United States collaborations between industries and universities are characterized by a formal framework that was implementing since long periods to that of Japan [21].

d) At the level of adaptation to changes of intoxication: Their system is not well considered this aspect it's ineffective because of the sense in that Japan may have had to change in the economic climate.

However, the United States their system is able to respond effectively to change their intoxication or outside; the American system is considered social and environmental needs are the drivers and objectives of innovation.

Conclusion

Japanese innovation systems are characterized by interactions between different actors. Each of them directly or indirectly involved in the production and transfers of knowledge. Note that these transfers are sometimes involuntary. Today, companies face a new challenge: the satisfaction of a demand for more diverse on very highly competitive markets. Japanese innovation systems are in perpetual motion: These movements are related to the historical and social changes, the industrial revolution, wars, the emergence of mass production, consumer behavior change. The main objective of the innovation will be to define its true purpose.

Meeting consumer expectations. That is why, marketing is the necessary condition for the success of the innovation system. Therefore, there is a question arises: "Where is the place of the consumer in the system?

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