

2G07 Effects of institutional systems on diffusion of innovation-comparative analysis between Japan and Turkey focusing on geographical dimension

○GUNDUZ Faith, 渡辺千仞 (東工大社会理工学)

Abstract

The emerging of technological innovations and diffusion of them greatly depends on the existence of institutions. That is to say, institutions drive innovation and stimulate broad diffusion. If the Institutions work right and carry out the expected functions, sustainability of innovations can be provided. This, in turn, constitutes a virtuous cycle between technological innovations and economic growth. Consequently, a nation can gain the competitive advantage over the other nations. In this context, after a brief information about institutions is given, the resources of effective IT utilization and being in Japan and Turkey is mentioned. Lastly, unique institutional characteristics of Turkey compared to Japan especially its geographical position is touched on.

1. Introduction

Institutions

Institutions are very important and essential for a nation to make economic growth and compete with the other nations. In this context, effectiveness and nature of institutions makes the nations competitive among the others. By this time, many definitions about institutions have been made.

North (1994) defined institutions as follows: "The humanly devised constraints that structure human interaction. They are made up of formal constraints (e.g. rules, laws, constitutions), informal constraints (e.g. norms of behavior, conventions, self-imposed codes of conduct), and their enforcement characteristics. Together they define the incentive structure of societies and specifically economies". Thus, institutions play a significant role in inducing and diffusing technological innovation.

Baranson's concept of the interaction between internal technology and external technology explains well what exactly an institution means and what components an institution has. The concept postulated by Baranson is that Internal technology means qualification of the R&D environment and consists of quality and quantity of resources for R&D. External technology consists of the "economic environment," "physical and natural environment" (such as energy, resources and geographical conditions), "social and cultural environment" (such as informatization, education, ethics of labor and entrepreneurs, customs and tradition, and preferences of consumers) and "policy system". These components are collectively designated as "institutions".

Cairncross (1997) examines the effects of IT revolution in such broad-ranging fields as designated "institutions" encompassing:

1. commerce and the shape of the company,
2. the economy,
3. society and culture, and
4. government and the political process.

Watanabe et al. (1998) addressed the definition of "Institution" as the one that consists of three dimension, historical background, firm organization, culture and strategy, national strategy and Social rules. (See Fig. 1) The institution is realized as the interaction of those three dimensions and is unique one for each society.

In institutional system, technology development and the advancement of institutional system co-evaluates with dynamic character. IT's diffusion process is characterized by self-propagating behavior creating new functionality through interactions with institutional system. New technology evolves, and the institution adapts this technology or not. Once it adapts, technological innovation diffuses with dynamic carrying capacity emerging with functionality development by self-propagating behavior and continues to sustain its co-evolution with institutions in increasing trend. But once it does not adapt, new technology separates from institutional system and diminishes until it disappears. Figure 2. shows this mechanism.

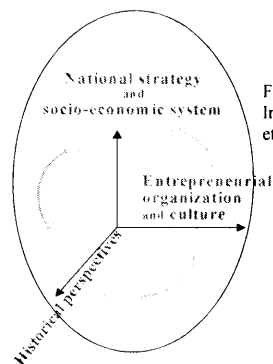


Fig. 1. Dimensions of Institutions. Source: Watanabe et al. (1998).

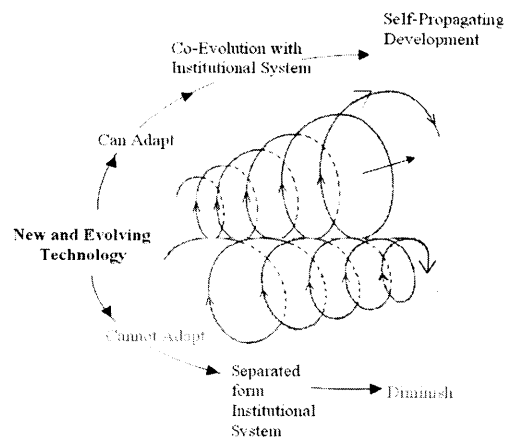


Fig. 2. Co-Evolutionary Dynamism between Technology Development and the Advancement of Institutional System. Source: C. Watanabe et al., 2003.

In Institutional system, economic growth of nation is conducted by three big subsystems:

- Social economic system
- Geographical factor
- Technological innovation

Each of these systems has own sub-factors such as in social economic system; economic system, socio-cultural system, political system, in geographical factor: demographical factor, geological factor, geopolitics/economics, in technological innovation; education, science innovation, and industrial innovation. Each of the sub-systems has relationship between economic growth and institutional development. Fig 3. shows the relationships on these systems.

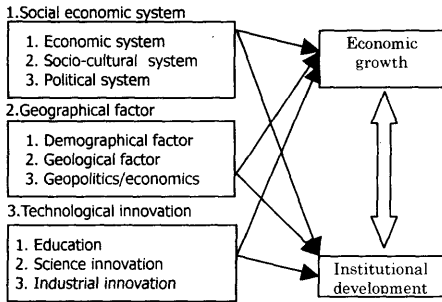


Fig. 3. Sub-systems of economic growth and their relations in institutional system.

Institutional elasticity

Institutions are the sources for technological innovation. Effectiveness of institutions (whether they work right or fulfill the expected duty or not) depends on their institutional elasticity. Institutional elasticity can be defined as the ability of institutions to react or respond flexibly to environment changes, new functions, and innovations.

Institutional elasticity plays a significant role in creating of demand through IT's development. IT products provide users more and new functionalities. Utilization of these new functions depends on the institutional ability of elasticity.

Institutional elasticity can be seen in behavior of labor, especially its productivity against changes in fundamental factors such as wages, trends in the institutional elasticity indicator can be observed by measuring wage elasticity to labor productivity. Watanabe and Kondo (2003) in their paper demonstrate that this elasticity in Japan's manufacturing industry decreased dramatically to 0.41 before the period of the bubble economy (1975-1986); 0.32 during the period of the bubble economy (1987-1990); and 0.18 after the bursting of the bubble economy (1991-1996). Figure 4. shows this elasticity decrease.

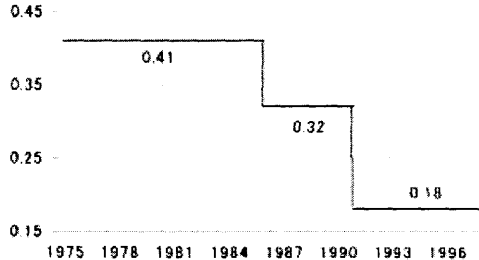


Fig. 4. Trends in institutional elasticity by measuring wages elasticity to labor productivity in Japan's manufacturing industry (1975-96).

2. Utilization of Information Technology (IT)

IT utilization largely depends on the structure of institutions, that is, institutional elasticity. Nowadays societies became information and interactive societies with the development of IT. In this information society, how institutions adopt and integrate IT became crucial factor for nations to develop and compete with each other in the information era. And utilization of the new technologies, innovations, new concepts and management styles emerging with IT advancement will undoubtedly become a significant driving force in sustaining economic growth.

Every country has own culture, values, customer preferences, traditions and customs, ethics. But rapidly improvement in Information technology around the world is inevitably forcing traditional societies to transform their socioeconomic structures towards the trajectory of IT diffusion. 1980s was industrial society. With the new economy emerging in USA, a new paradigm, information era, shifted the industrial society to information society. Before it emerged, the countries which saw this revolution and prepared itself towards this trajectory provided rapid economic growth and got competitive advantages which utilization of IT brings together. In this revolution of IT, among the other countries USA exploited most the benefits of IT development. US DOC (2000a) pointed

out that "Although IT is generally available in world markets, the US economy to date has achieved greater gains from IT than other countries at least partly because of favorable monetary and fiscal policies, a pro-competitive regime of regulation, and a financial system and business culture prepared to take risks". As we mentioned above utilization of IT depends on institutional elasticity. US DOC description above and great utilization of information technology by US demonstrates that US has flexible institutional elasticity enabling a flexible labor market, stimulating activated competition in the market-place, and inducing risk-taking business challenges as well as broad utilization of IT products in the new economy and information era. The US's achieve can be attributed to such institutional elasticity.

3. Comparison of IT Utilization in Japan and Turkey

Nowadays we are living information-knowledge era and all nations' societies are proceeding to the way of becoming an information society emerging with the new economy driven by information technology revolution rather than industrial society driven by manufacturing industry in 1980s. And every nation is competing with each other to become a leader for making technological innovations induced by IT development. Consequently Japan and Turkey are taking their steps in the way of becoming an information society as well. Currently Japan has come the mature level in the way of becoming an information society by the effective utilization of IT resources. This, in turn, is curing its economy and taking the place of its competitiveness again.

On the other hand, we can not say the same things about Turkey related to effective utilization of IT. Many datas shows us that Turkey could not enter to the new economy with prepared state and achieve the effective utilization of IT. There is no way but effective utilization of IT, enlightening the whole generation, and providing the requirements to individuals for Turkey to make progress and economic development. But nowadays, it seems that Turkey has understood the importance of the effective utilization of IT. In the way of doing this, Many important efforts are tried to carry out in achieving IT utilization by Turkey.

As we mentioned before, institutions and institutional elasticity are greatly related to effective IT utilization. Japan's domestic institutions functioned efficiently during the era of an industrial society driven by manufacturing industry. However, a new phenomena, new economy, formed by information society emerged in the 1990s shifted manufacturing industry to IT-focused industry and Japan's traditional institutions did not function as efficiently as they did in preceding decades. Japan's success in achieving sustainable development during the "catch-up" years up to the end of the 1980s in the industrial society can be attributed to a high institutional elasticity and its state of institutions. But unfortunately despite a high institutional elasticity up to the end of 1980s, Japan's institutional system has lost its elasticity in the shift from an industrial society to an information society emerging in the 1990s. Therefore, a virtuous cycle between institutional elasticity and economic development changed to a vicious cycle leading to solid institutional elasticity between non-elastic institutions and economic stagnation resulted in losing international competitiveness. Figure 5, which was reproduced from the OECD's report on the OECD Growth Project shows the correlation

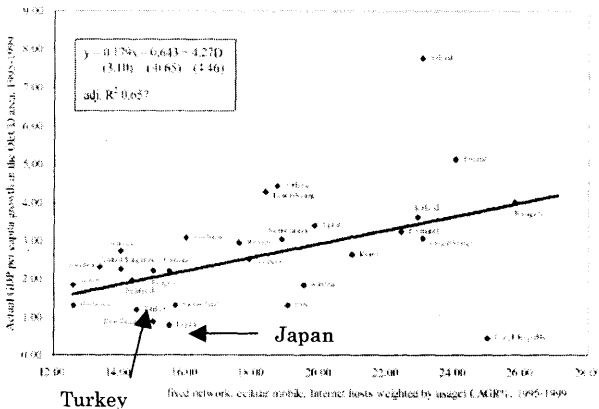


Fig. 5. Network expansion and GDP growth (1995-1999). Source: OECD report.

between Network expansion (fixed network, cellular mobile, internet hosts weighted by usage) and GDP growth. In this figure it is clearly seen that Japan's and Turkey's IT contribution to productivity is far behind the average level of developed countries.

In order to demonstrate how Japan and Turkey lags behind in utilizing the benefits of IT compared to other OECD countries, a trend line was indicated based on regression analysis.

If we examine the figure, Japan and Turkey is far behind the OECD average, which resulted in not achieving the expected GDP growth rate with respect to the increase in network development. That is to say, Japan and Turkey do not seem to fully utilize the potential benefits of IT to achieve high growth in GDP.

Let us go forward through some IT data which are internet users and mobile phone trend between Japan and Turkey. As we mentioned before about IT utilization or providing potential benefits of IT resources as a national competitive advantage, these figures demonstrate our thesis that compared to Japan Turkey could not achieve effective utilization of IT. But unlike from constant or decreasing trend it shows an increasing trend in both parameters.

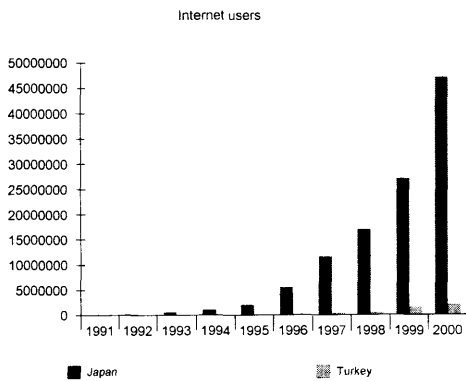


Fig. 6. internet users in both Japan and Turkey. Resource: World development indicators

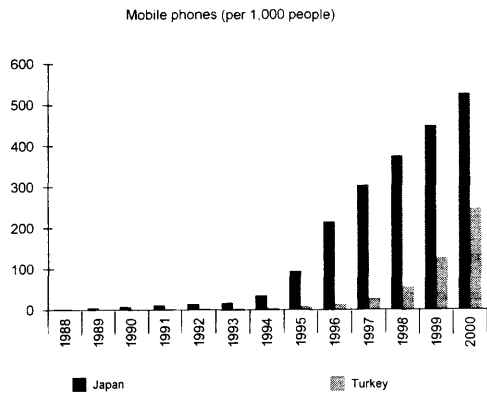


Fig. 7. Mobile phones subscribers per 1000 people in both Japan and Turkey. Resource: World development indicators.

4. Special Unique Institutional Characteristics of Turkey Compared to Japan-Focusing on Its Geographical Position

Every nation has its own institutional system and structure. While every institutional system may have similar points shared by each institutions, there are different characteristics some do not have in their structure as well. Looking at the institutions of Japan and Turkey, They have some similar and different characteristics. In this context we will focus on Turkey's unique institutional characteristics especially its geographical

location. Turkey has a very important, unique, and strategic geographical position. Turkey is located at a point where the three continents making up the old world, Asia, Africa and Europe are closest to each other, and straddle the point where Europe and Asia meet. Turkey lies at the axis of the cultures of the East, the West, the Middle Eastern, the Mediterranean and Islam. Turkey's geographical location has made it the land bridge between Europe and Asia for many thousands of years. Turkey's unique geography has been shaping its historical role and relative political importance in international relations. This, in turn, may add some merits for its economic growth. But Turkey's government should show a foresightful attitude in international relations. Fig. 8 shows its location in the Asia, Europe, and middle east.

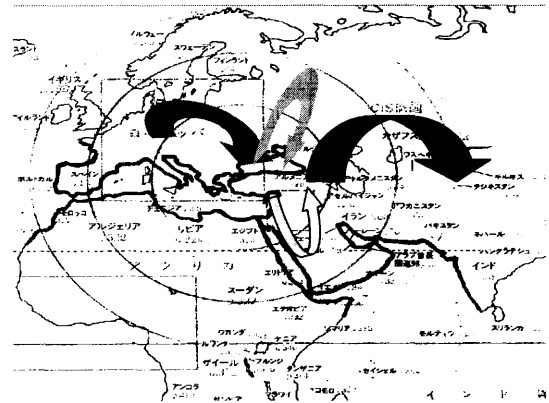


Fig. 8. The unique geographical location of Turkey.

We can mention some advantage point about its geographical location:

- Turkey locates on the most important place where Asia, Europe and Middle East are integrated.
- Turkey is the center of the world and center of the three big continents Europe, Asia, and Africa.
- The trade roads which are from Europe to Asia passes from Turkey.
- Silk road starts from China and ends in Turkey.
- The highways that integrates Arabic countries to Europe passes Turkey.
- Turkey is in the center of many different resources such as technology of Europe, petroleum of middle East and Saudi Arabia, gas of Russia and middle Asia. Utilization of these resources greatly depends on the government policies being one of dimension of institutional dynamics and effectiveness on international relations.
- Turkey is a historically and culturally rich country with a unique sociological experience making it an special country with its geopolitics.

Some comments about Turkey

- A powerful Turkey can change economic balances in its location.
- With the integration of European Union (EU), Turkey will definitely fulfill economic growth. Standardization and qualification in industry, management methods, government activities and technologic improvements (like easiness in technology transfer) are expected to be constituted. On the other hand EU also would have a powerful hand at that location against some countries like America, China.
- Turkey might be a marketing-trade center of EU in Asia, Middle-east, and the Caucasus.
- Turkey might be passing point of natural gas, petroleum, and energy resources from middle-east to EU.
- Turkey has potential to be able to become an alternative country of China in its region with its cheap, young, and qualified labor power.
- Controlling of The Black sea, The Marmara Bosphorus which

provide some countries such as Russia, Bulgaria, Romania, Ukraine to go warmer climate regions for trade adds positive value to its economy.

- Having democratic-muslim identity might add a value in improvement of international relations.

What should Turkey do to achieve economic growth?

- Revised and qualified educational system.
- Standardization
- Increase R&D efforts and expenses
- Provide an active, systemic, and purified government and governing system from bureaucratic obstacles.
- Increase technological innovation efforts.
- Privatization of state enterprises.
- Effective IT utilization.
- Make strong alliances and tie-ups with government, universities-research institutes, and industry.
- Increase the amount of universities, research centers and staffs.
- Use competitive geographical position advantage effective for its economic growth.
- Use its dynamic resources as an advantage point.

5. Conclusions

We can refer to some points as conclusion;

- The resources of the innovation are institutions, that is to say, institutional elasticity. They drive innovation and accelerate broad diffusion.
- Effective utilization of IT greatly depends on the nature and flexible reaction of institutions.
- Japan had flexible institutional structure in the industrial society era, but it lost its institutional elasticity resulting in losing world competitiveness in the information society.
- Turkey could not exploit potential benefits of IT revolution compared to Japan and other developed countries, but it is currently recovering on this way.
- Turkey has an unique and strategic location, and can use its geographical position as an institutional dynamism in order to make a significant economic growth and compete with other countries.
- If Turkey used its unique geographical position effective, it would provide a competitive advantage for its economic development. But to date, it was not able to achieve this.

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