**Session 3(9/21) : Technological Changes**

**: Giovanni Dosi (1982). Technological paradigms and technological trajectories: A suggested interpretation of the determinants and directions of technical change**

0. Introduction

In session 2, we had time for over-viewing technological innovation. The part of our presentation team was Kuhn’s book. The most important concept of that is “Paradigm” and “Science Changes”. This week, I should prepare for the leading discussion of next week. I think that the next subject, technological paradigms and technological trajectories, is related to Kuhn’s idea. Let’s start now.

1. Summary of the Paper

Because Dosi(1982) thought that the concept of “technology” was similar to “science”, he also examined that “technological paradigms” and “science paradigms” resemble each other in many ways. According to his opinion, the continuous changes of technological innovation have a relationship with technological trajectory defined by a technological paradigm, and the discontinuous changes of technological innovation are associated with the emergence of a new paradigm.

He suggested the framework for accounting for the factors, economic, institutional, and social factors, interact with technical part. He gave the idea of paradigms and trajectories for explaining the observation phenomenon of cumulativeness of technical advance, and identified a series of process, “search” – “selection” – “maturity”. In addition, he tried to suggest some interacting mechanisms between technological factors and economic factors, the latter performing as selective criteria as final (“market”) checking and as a continuous form of incentives, constraints and “feed-back” stimuli.

2. Main contribution

One of consequences of this paper is to establish a sufficiently general framework which accounts for all these factors and to define the process of selection of new technological paradigms among a greater set of notionally possible ones.

In general, many scientists or technicians think technology changes are from their research efforts. However, Dosi(1982) tried to verify how to technical and technological changes are broken based on the economic theory. Finally, he found that the technological paradigm was existed for the basis for the determination of the formal innovations. Actually, Kuhn already had defined the concept of “paradigm” before, but Dosi(1982)’s idea has great historical significance to adapt the “paradigm” concept in the technology[[1]](#footnote-1).

3. My own questions

1) What do you think about “prime mover” of inventive/innovative activity?

- Why do you think like that?

- What theory is related with your thought? (i.e. demand-pull, technology-push, etc.)

2) Think about what process is the most important process on technological paradigm and trajectory?

- Please, choose the process among “search”, “selection”, and “maturity” and explain your choice to us.

3) What are main features of today’s technological changes?

- Why do you think like that?

- Are there some cases for describing main features of technological paradigms, and technological trajectories?

4. Critique

The connection and relation between hardware type as technological paradigms and software type as social paradigms is deeply impressive. It is good idea for suggesting the importance of interaction among internal and external elements of firms.

According abstract and conclusions of this paper, Dosi(1982) suggested a model which accounted for a sufficiently general framework for describing all factors – scientific advances, economic factors, institutional variables, and unsolved difficulties on established technological paths- and for defining the process of selection of new technological paradigms among a greater set of notionally possible ones. However, there are weaknesses for doing these all things.

It is uneasy to find the simulation and experimental model of general framework. Absolutely, he did a critical review of the theories of technical change, “demand-pull” and “technology-push”. Based on these critical reviews, he gave the tentative mechanism for outlining the complexity, the relative autonomy and the uncertainty associated with technological change and innovation. Nevertheless, it is tough work for finding the model and for depicting the model as a general framework.

For backing up the technological trajectory, he suggested the process as three steps, “search” – “selection” – “maturity”. In the maturity process, we can identify two phases. At the first phase, the production of major technological advances has been the result of organized R&D efforts as opposed to the “inventiveness” of individuals. At the second phase, the production exploitation and commercial diffusion of innovations are much less divorced and technical change often becomes itself part of the pattern of “oligopolistic competition”. Also, he said that “oligopolistic competition” is for not only the technological progressiveness of firms but also some static entry barriers.

In general, new technologies appear on their industries, there are many competitors for gathering a larger share of the technologies. It is impossible to be successful position for all competitors of new technologies. Some of them firmly establish their position on their industries, and lead the technology flows.

There are some exceptions for it. For example, one of Tushman and Anderson(1986)’s ideas, a competence destroying is exactly the opposite description. Sometimes, the new methodologies or ideas for reversing technology paradigm or trajectory turn up accidently by new leading firms or institutes.

Thank you for reading this material. I know that there are many mistakes (grammar, logical unfolding). I ask for your understanding regarding this matter.

1. Kuhn’s idea was for science. For adapting the “paradigm” concept to the technology part, Dosi(1982) redefined some words.

   Technology: a set of pieces of knowledge, both directly “practical” (related to concrete problems and devices) and “theoretical” (but practically applicable although not necessarily already applied), know-how, methods, procedures, experience of successes and failures and physical devices and equipment

   Technical progress: technological paradigm, technological trajectory (the pattern of “normal” problem solving activity) on the ground of technological paradigm

   Technological paradigm : a model and a pattern of solution of selected technological problems, based on selected principles derived from natural sciences and on selected material technologies

   Technological trajectory: the pattern of “normal” problem solving activity (i.e. of “progress”) on the ground of a technological paradigm [↑](#footnote-ref-1)