

Pathways to Innovation: Policies, Products, and Processes for Competitive Advantage in a Global Economy

by René Haak

Ladies and Gentlemen,

I too would like to welcome to you to our conference on “Pathways to Innovation: Policies, Products, and Processes for Competitive Advantage in a Global Economy”. I am delighted that the subject has met with such a positive response in the worlds of science, economics and administration and am looking forward to two days of interesting discussions in this wonderful conference hall at Nishogakusha University. However, before we move onto the individual talks in session 2, I’d would like to share a few points about the subject of the conference with you, which should be considered as input to the discussions later on.

Corporate innovation has been the subject of lively discussion in Japan and Germany for many years. The development and marketing of new products and processes and of management know-how and its rapid penetration throughout the economy are crucial for the success of the technological productivity of a country. The income and employment associated with marketing have a significant effect on the productivity of a national economy. Particularly given the increasing pressure of international competition, the readiness of companies to innovate is a deciding factor in the success of a country’s performance. This readiness determines export opportunities, productivity improvements and job creation in industrial countries.

It is clear that a broad orientation towards innovation in the economy is the key factor for prosperity effects on the economy overall. Competition between many market participants to provide the best solution is vital, particularly for companies to succeed particularly on an international level. Schumpeter still assumed that technical innovations occur in clusters as a consequence of “basic innovations”. However, the view now prevails that technological innovations are derived from technological paradigms. Dosi coined the term “technological paradigm” as early as 1982. Following Kuhn he defined it as a:

...pattern of solution of selected technoeconomic problems based on highly selected principles derived from the natural sciences, jointly with specific rules aimed to acquire new knowledge, and safeguard it, whenever possible, against rapid diffusion to the competitors (Dosi 1988, p. 1127).

What is at the heart of this definition? It means that a technological paradigm consists of a new technologically significant idea, the core of the paradigm and a number of investigative methods (heuristic methods) to aid further development of this core.

What was fundamentally new about this point of view? It was that the technological trajectories were seen as cumulative and gradual lines of processing dependent on special contextual conditions, and that the overemphasis on discontinuity in association with basic innovation was rejected. Lines of processing can also be understood as developmental paths - pathways to innovation.

What is the starting point of a technological paradigm? Where are the roots of the development of a technological paradigm? The crystallisation point is the technology prevailing at that time in the company. The technological trajectories or pathways to innovation develop because companies want to improve their current technology and apply it to new problems. Therefore, the still unknown solutions to the underlying problems are obviously based on cumulative learning processes. Empirical studies show that successful innovations are founded on technological and commercial abilities (Cooper 1983; David 1975; Rosenberg 1982). They also show (Kromphardt and Teschner 1986) that most companies are at pains to introduce those technological innovations which allow them to build on their existing routine and do not oblige them to move away from it completely.

As every technological paradigm is based on very specific research methods, scientific sources and combinations of in-house and publicly accessible technological expertise, it is only possible to make general statements about which factors are required for the establishment and propagation of paradigms, about how different paradigms develop and how paradigms might change under certain circumstances.

Scientific progress is one of the key influences on the creation of new technological paradigms. In how far the potential created by scientific progress is also realised depends on the organisations functioning as bridging institutions between pure research and commercial realisation, on institutional rules intended for realisation in state-owned businesses and authorities (for example, in space travel), on innovatory companies and also on innovatory users. An important determinant in explaining the differences in technological paradigms is the ability of the innovating

company to retain or realise the gains and the new knowledge from its own innovations. Factors which encourage retention of gains from innovation are patents, secrecy, a head start, learning curve effects, increasing economies of scale, the high costs of imitation, and a high standard of services. A head start and learning curve effects are, according to empirical studies, particularly suitable tools for protecting process innovations, whereas patents offer relatively better protection to product innovations.

Market influences and the discovery of new scientific knowledge play a large part in the make-up of technological paradigms, in that they stimulate and obstruct them and focus research efforts more strongly on new paradigms. In this sense, one could also see innovations and pathways to innovation as processes reacting to changes in relative price levels, in demand and in new technological opportunities. One could even go as far as to say that technological advances are largely determined by the competition process, whereby the company's expectations of profit have a much stronger impact on innovation than loss situations. One can conclude therefore that companies do not need crises to innovate but profits; with the proviso, however, that crises often contribute to new thinking and that new ideas and management concepts can only be accepted in a company in this way. It is also clear that companies will try constantly to improve their basic technology and products in line with market requirements.

Contextual conditions represent more variables which contribute to the development of technological trajectories. These contextual conditions can for example be very close relationships between producer and users through which information is exchanged or changes made to the technological set up. These close relationships are of key significance in the process of innovation. Furthermore, technological bottlenecks and

favourable opportunities also represent particular country- or company-specific contextual conditions. Other contextual variables, which arise in the development of the technological paradigms and which acquire significance are the development of specific infrastructures, the development of complementary technologies and the setting of specific technical standards which have a positive effect on certain patterns of innovation.

This allows us to characterise technological paradigms as irreversible processes of technological change which proceed along very specific tracks or paths. The role played in this by the policies of the country in question, by the innovating companies, by the bridging institutions, and by the social and corporate conditions must be observed more closely to allow the factors which stimulate success to be understood. Accordingly, we want to look at the specific innovation systems, the role of the company, the significance of policies and the effect of public-private partnerships in the various sessions. These exogenous factors then provide the context for understanding how variations in the “intra-firm” paths to innovation affect company performance. Given our understanding of the policy instruments, economic institutions, and governance structures derived from this conference, the final session will examine whether the pathways to innovation in developed and developing countries have led to economic development.

I am looking forward to a fruitful discussion on the various subjects of the conference

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Thank you very much for your attention.