

SCHUMPETERIAN ECONOMICS AND THE TRILOGY OF 'INVENTION-INNOVATION-DIFFUSION'

INTRODUCTION

The R&D-based Linear model of innovation is structured on three consecutive stages: Basic Research, Applied Research and Development. 'Keynesian Economics and the Linear Model of Innovation' of this series, studied the role of innovation in the Keynesian economics, the dominant economic doctrine in the wake of the Second World War. That report concluded that that the Linear (R&D) model acted as the tacit innovation base for Keynesian economics.

It is worthy of mentioning that the R&D formation is not the only model for innovation. In the economics and management textbooks, indeed, there exists a wide range of references to another formation, which is based on the Trilogy of "Invention - Innovation - Diffusion." This trilogy has widely been referred to Joseph Schumpeter, who has been credited for elaborating this formation and being praised as *the* economists who integrated innovation in the economic studies. Richard Swedberg (1991) indicates that Schumpeter's fame among mainstream economists rest on his attempt to introduce *technical change* into marginal utility analysis¹. Schumpeter's thoughts have not yet passed out the circle of academia and intellectuals, probably because "Schumpeter did not want to write for the common reader but only for the elected²".

This report intends to spread a new light on what Schumpeter wrote about innovation. It argues that Schumpeter's *main* attention was the business cycles rather than innovation. Schumpeter employed innovation to explain the nature of the business cycles. No doubt, Schumpeter is ahead of other economists of this century to considering a role for innovation in the process of economic development. However, in his studies Schumpeter himself has rarely been endeavored to a deep study of the process of innovation, and specifically the Trilogy of 'Invention-innovation - diffusion'.

SCHUMPETER'S BIOGRAPHY



Joseph Alois Schumpeter (1883-1950) was born in Trieste, then part of the Austro-Hungarian Empire. In 1901 Schumpeter enrolled at the University of Vienna and began to study economics; then in 1906 he received his Ph.D. when was just 23 years old. In 1908 he wrote the preface to his first book: *The Nature and Essence of Theoretical Economics*; in 1911 published "*The Theory of Economic Development*", and in 1914 he wrote "*Economic Doctrine and Method*." In 1919 he became a professor of economics.

On March 15, 1919, Schumpeter became the finance minister in the new Austrian government, which was a coalition government made up of the Social Democrats and members of the Christian Social Party. After a few months, on October 17, 1919, he resigned. Richard Swedberg, his biographer believes it is generally agreed that Schumpeter was a failure as finance minister³.

In 1921 Schumpeter became the president of a small and highly respected Viennese banking house, the Beidermann Bank. Schumpeter's venture into banking ended badly. In 1924 the bank became insolvent, Schumpeter had to resign and the bank was liquidated. In the same year he published a thoroughly revised edition of *The Theory of Economic Development*. From 1925 to 1932, he was the Chair of Public Finance at the University of Bonn.

From 1932 until his death in 1950, Schumpeter lived in the US and was a Harvard Professor. In 1933 he taught the first course in mathematical economics at Harvard. In 1934 an English translation of *The Theory of Economic Development* and in 1939 Schumpeter's *Business Cycles* appeared. In 1942 Schumpeter published '*Capitalism, Socialism and Democracy*'. Schumpeter died on January 7, 1950.

THE TRILOGY OF INNOVATION

In the economics and management textbooks there exist a wide range of reference the Trilogy of 'Invention-Innovation-Diffusion'. The following notes by Paul Stoneman (1995⁴) provides an insight to this matter:

The Schumpeterian trilogy that divides the technological change process into three stages is often considered to provide a useful taxonomy. The first stage is the invention process, encompassing the generation of new ideas. The second stage is the innovation process encompassing the development of new ideas into marketable products and processes. The third stage is the diffusion stage, in which the new products and processes spread across the potential market. The impact of new technology occurs at the diffusion stage and thus the measurement of impact is very much a measurement of how the economy changes as new technologies are introduced and used.

The Schumpeterian trilogy uses 'innovation' to describe a particular stage in the technological process. Innovation, is however, used widely as a term to describe the whole technological change process representing a shorthand for doing something new.

The Schumpeterian trilogy can be matched to other concepts used in the literature. Commonly, science is associated with the early stages in the trilogy, say, invention, whereas technology is often associated with later stages in the trilogy. The Schumpeterian trilogy may also be related to the research and development process. R&D is often broken down in to basic and applied research and development spending. In terms of the Schumpeterian trilogy, basic research will relate closely to the invention process, applied research and development will relate to the innovation stage.

In the last paragraph of the above, the inter-link among the three stages of “Invention, innovation and diffusion” and R&D is quite interesting. Although there may be no such as direct relationships between the two paradigms. As an example, Einstein’s work in theoretical physics, which is an excellent example of basis research, is not being considered as ‘invention’. How many patents did hold Einstein? On the other hand, Edison’s works, which is a classical example of invention, has not been based on his ‘basis research’ works.

Schumpeter’s own writings, however, do not articulate the distinction between the above trilogy. In “**The Creative Response in Economic History**”⁵, which is a document among his last published articles, Schumpeter refers to ‘innovation’ as “The doing of new things or the doing of things that are already being done in a new way.” The following parts, from “Business Cycle”⁶, reveal Schumpeter’s own understanding of the relationships between “Invention” and “Innovation”:

[I]n short, any “doing things differently” in the realm of economic life - all these are instances of what we shall refer to by the term Innovation. It should be noticed at once that that concept not synonymous with “invention”. Whatever the latter term may mean, it has but a distant relation to ours. Moreover, it carries misleading associations.

First, it suggests a limitation which is most unfortunate because it tends to veil the true contours of the phenomenon. It is entirely immaterial whether an innovation implies scientific novelty or not. Although most innovations can be traced to some conquest in realm of either theoretical or practical knowledge, there are many which cannot. Innovation is possible without anything we should identify as invention and invention does not necessarily induce innovation, but produces of itself no economically relevant effect at all. The economic phenomena which we observe in the special case in which innovation and invention coincide do not differ from those we observe in cases in which preexisting knowledge is made use of. Stressing the elements of invention or defining innovation by invention would, therefore, not only mean stressing an element without importance to economic analysis, but it would also narrow down the relevant phenomenon to what really is but part of it.

Second, even where innovation consists in giving effect, by business action, to a particular invention which has either emerged automatically or has been made especially in response to a given business situation the making of the invention and the carrying out of the corresponding innovation are two entirely different things. They often have been performed by the same person; but this is merely a chance coincidence which does not affect the validity of the distinction. Personal aptitudes - primarily intellectual in the case of inventor, primarily volitional in the case of the businessman who turns the invention into an innovation - and the methods by which the one and the other work, belong to different spheres. The social process which produces inventions and the social process which produces innovations do not stand in any invariant relation to each other and such relation as they display is

much more complex than appears.

In many important cases, invention and innovation are the result of conscious efforts to cope with a problem independently presented by an economic situation or certain features of it. Sometimes *innovation* is so conditioned, whereas the corresponding *invention* occurred independently of any practical need. This is necessarily so whenever innovation makes use of an invention or a discovery due to a happy accident, but also in other cases. It might be thought that innovation can never be anything else but an effort to cope with a given economic situation. In a sense this is true. For a given innovation will satisfy them, and as a rule they can be satisfied in many different ways. Most important of all, they may remain unsatisfied for an indefinite time, which shows that they are not in themselves sufficient to produce an innovation.

We will now define innovation more rigorously by means of the production function previously introduced. This function describes the way in which quantity of product varies if quantities of factors vary. If, instead of quantities of factors, we vary the form of the function, we have an innovation. ... We will simply define innovation as the setting up of a new production function. This covers the case of a new commodity, as well as those of a new form of organization. ... Innovation combines factors in a new way.

Obviously, Schumpeter in the above is silent on ‘Diffusion’ of the Trilogy of “Invention - Innovation - Diffusion.”

ENTREPRENEURSHIP

Drucker (1986) believes “Schumpeter insisted that ‘innovation’-that is entrepreneurship that moves resources from old and obsolescence to new and more productive employments - is the very essence of economics and most certainly of a modern economy”⁷. Schumpeter, however, does not seem to be so crystal clear on this matter. In **Capitalism, Socialism and Democracy**⁸, page 132 Schumpeter writes:

“[T]he function of entrepreneurs is to reform or revolutionize the pattern of production by exploiting an invention or, more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way, by opening up a new source of supply of material or a new outlet for products, by reorganizing an industry and so on. This [entrepreneurial] function does not essentially consist in either inventing anything or otherwise creating the condition which the enterprise exploits. It consists in getting things done.

Schumpeter, then, continues as in the following interesting fashion:

“This social function [i.e. entrepreneurship] is already losing importance and is bound to lose it at an accelerating rate in the future even if the economic process

itself of which entrepreneurship was the prime mover went on unabated. For, on the one hand, it is much easier now than it has been in the past to do things that lie outside familiar routine - innovation itself is being reduced to routine. Technological progress is increasingly becoming the business of teams of trained specialists who turn out what is required and make it work in predictable ways.”

In “**The Creative Response in Economic History**”⁹, Schumpeter writes:

It is particularly important to distinguish the entrepreneurs from the “inventor”. There is no necessary connection between the two functions. The inventor produces ideas, the entrepreneur “gets things done”, which may but need not embody anything that is *scientifically* new. Moreover, an idea or scientific principle is not, by itself, of any importance for economic practice. “Getting new things done” is not only a distinct process but it is a process that produces consequences that are an essential part of capitalist reality. It is in most cases only one man or a few men who see the new possibility and are able to cope with the resistance and difficulties with which action always meets outside of the ruts of established practice.

He believed technological competition through new and improved products and processes was an order of magnitude more important than ‘normal’ price competition between firms, which was the subject of most orthodox theory of economics.

SCHUMPETER AND THE ECONOMIC CYCLES

Schumpeter’s main attention was economic cycles, a topic he deeply studied. Schumpeter (1927¹⁰) argues that “There are really four groups of problems which come under the head of “Industrial Fluctuations”: The “seasonal fluctuations”, the “cycle”, the “long waves” and the “sectoral trend”. By “theory of the business cycle” we may mean, first, an analysis of any single one of the cycles which history records, or, arising out of such analysis of many or all recorded cycles, a reasoned history of the phenomenon. According to Graham Bannock (1987¹¹), Schumpeter built up a theory of the trade cycle which was based on three time periods, (a) short, (b) medium, and (c) long, to each of which he attributed different causes.

Richard Swedberg¹² considers that “in Schumpeter’s opinion, the Depression could not be alleviated by interventions of the state. The business cycle should not be disrupted; it had to work itself out, through the downs as well as ups. Schumpeter was extremely critical of Roosevelt and his New Deal.” This is probably the main practical distinction between the Keynes’ and Schumpeter’s economics.

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