Schumpeter: an appraisal of his theory of innovation and entrepreneurship

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Introduction

Attention for Schumpeter's contribution to economics and the social sciences in general has, albeit with fluctuations, gradually increased over the past decades. The present paper concentrates on only a few topics from Schumpeter's theory on the dynamics of capitalist economic development, in particular on his analysis of innovation and entrepreneurship. A recent contribution by Santarelli and Pesciarelli (1990) concentrates on Schumpeter's work published between 1908 and 1926, stressing the emergence of his theory of entrepreneurship in his pre-Harvard period. This early period in Schumpeter's writings, partly coinciding with his stay in Vienna, covers his contributions to economic theory and his understanding of the entrepreneurial function up to the second German edition of *The theory of economic development* in 1926. Another recent assessment of Schumpeter's contribution is Scherer's (1992) evaluation of the impact of in particular *Capitalism, socialism and democracy* on innovation-related aspects of industrial organization. Scherer discusses the so-called Schumpeter-hypotheses on market structure, firm size and innovation but does not address entrepreurship at length. The present paper complements these two valuable contributions by investigating the role that Schumpeter's theory of innovation and entrepreneurship, both in small and large firms, has played throughout his academic career.

The two main topics in the present contribution have to be seen as interrelated as the role of 'the' entrepeneur in Schumpeter can only be understood if it is placed against the background of his theory of innovation and economic development. Schumpeter's contribution is one of the few attempts in economics of the pre-World War II period to understand some of, what is nowadays known as, the 'black box' of technology (Rosenberg, 1982). As discussed below Schumpeter not only emphasized the role of the entrepreneur in his earlier work but continued to struggle with his concept of this dynamic economic agent throughout his academic career. In some of his final writings Schumpeter appears to return to his early conceptualization of the entrepreneurial function with a changed and modern version of the major economic change agent of economic development. A deeper appreciation and understanding of this evolution in Schumpeter's work points to new directions for theories and analyses inspired by Schumpeter's contributions, see also Hagedoorn (1989). Given this focus on Schumpeter's theory of entrepreneurship and innovation, this paper abstracts from a large number of other topics in Schumpeter's work, such as his broader theory of economic development, the future

of capitalism and socialism, and market structural aspects of innovative capabilities.[1] In the following Schumpeter's theoretical development will be traced through the 1934 English edition of *The theory of economic development* (TED), *Business cycles* (BC) from 1939, *Capitalism, socialism and democracy* (CSD) first published in 1942, *Change and the entrepreneur* (CE) from 1949, and *History of economic analysis* (HEA) that was published posthumously in 1954.

Innovation and capitalist economic development

The basics of Schumpeter's theory of innovation and economic development are found in his model of the circular flow as explained in TED. This circular flow describes a stationary situation of equilibrium and perfect competition similar to a Walrasian state of equilibrium. Every firm is in perfect equilibrium, costs equal income, prices equal average costs and net profits are zero. The circular flow follows from continuous adaptions to small external changes which are 'absorbed' through routine company behaviour.

It is important to note that this particular notion of the circular flow is not identical with the notion of stationary state as it was frequently applied in classical political economy. Smith, Ricardo and Mill had developed, albeit quite different, theories of the stationary state that pictured this economic equilibrium as the far or nearby 'ultimate' destiny of the economy (Dobb,1981). The stationary state in Schumpeter's circular flow is far from any ultimate destiny of the economy. His theory is in fact a particular treatment of Walras' theory of general equilibrium applied to contrast and explain economic development after a change in existing routines of companies takes place through innovation. Walras was especially influential on Schumpeter's writings on economic development in general, which gives Schumpeter a certain orthodox neo-classical flavour, see BC, p. 30 ff. Schumpeter's appreciation of Walras is clearly demonstrated in his statement that "... as far as pure theory is concerned, Walras is in my opinion the greatest of all economists. His system of economic equilibrium, uniting as it does, the quality of 'revolutionary' creativeness with the quality of

[1] A discussion of the theoretical link between Marx and Schumpeter is absent because the particular emphasis on the role of entrepreneurship allows me to ignore Schumpeter's appreciation of Marx. For detailed analyses of the Marx - Schumpeter connection the reader is referred to Elliott (1980), Sylos-Labini (1984) and Rosenberg (1986).

classic synthesis, is the only work by an economist that will stand comparison with the achievements of theoretical physics" (HEA, p. 827). Nonetheless, Schumpeter's early theory already had a number of a non-neo-classical properties since price-taking and an infinite number of small companies, characteristic for contemporary economic theory, were not relevant for his theory. Even the description of Schumpeter as a 'non-neoclassical general equilibrium theorist' (Kregel, 1985) is open to debate in the light of his later writings such as BC and CSD. In Schumpeter's theory equilibrium is also not a direct reflection of economic reality as some authors, see for example Smithies (1951) and Stolper (1981), assume. Equilibrium is much more a simple theoretical norm introduced to explain the disequilibrium effects of innovation.[2] Through innovation, for practical purposes defined at this stage as the succesful introduction of new products and processes, the economic system is driven away from the 'neighbourhood of equilibrium'. Then gradually, as the effects of innovation 'wear off', a new neighbourhood of equilibrium is restored again (BC, p. 68-71).

The disequilibrating role of innovation is the primary force driving cyclical movements between prosperity and recession and the establishment of a longer term new equilibrium in Schumpeter's pure model. Innovation is introduced into this model to explain the consequences of discontinuous, evolutionary change so characteristic of dynamic economic development. In the circular flow Schumpeter allowed for economic growth as a continuous stream of small changes in the economic system. He explicitly distinguished this economic growth from economic development as a difference between non-dynamic and dynamic change.[3] In his own words "... development ...is ... entirely foreign to what may be observed in the circular flow or in the tendency towards equilibrium. It is spontaneous and discontinuous change in the channels of the flow, disturbance of equilibrium, which forever alters and displaces the equilibrium state previously existing" (TED, p.64).

Schumpeter's theory of innovation, economic development and business cycles is apparent

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[2] This holds for Schumpeter's treatment of the subject in TED and BC. In CSD 'perfect competition' and 'equilibrium' are no longer applied to explain economic development.

[3] I think one can characterize this distinction in these terms in the light of present discussions on dynamic change and innovation (Nelson and Winter, 1982, Dosi, et al, 1988). Schumpeter himself did not favour the term 'dynamics' too much, see TED, p. 64.

in many of his writings, even in his early works, but it is most extensively, although not so conveniently, treated in his over 1,000-pages-long study on the subject (BC).[4] At the outset there is the so-called ’first approximation’ of the pure model of a two phase cycle with prosperity and recession. The pure model starts off with the circular flow which is disrupted by an innovation, financed not by savings but by bank credit. Innovating firms are able to achieve extra gains which are reinvested and spur a growing demand for capital goods, which in turn will lead to a rise in prices for capital goods. Gradually, the innovators are followed by imitators in a process of diffusion. The initial entrepreneurs will cause some deflation by repaying their bank loans but meanwhile diffusion still increases output. Gradually prices will tend to fall due to the increasing output and deflation, which will eventually cause a change from prosperity into recession.

The so-called ’second approximation’ of the secondary wave can be seen as a more empirical construct to be added to the pure model. Here, assumptions of the circular flow such as perfect competition and equilibrium are dropped. The secondary wave comes down to a cycle of prosperity, recession, depression and recovery. It includes economic reactions to the first wave such as a spreading of additional income, speculative operations and miscalculations by companies. Growing output leads to a decline in prices which together with excess capacity and miscalculations will create economic losses and a period of recession. A continuing recession leads to a depression, which wears off in a process of liquidation after which the remaining companies find new economic opportunities.

In the end Schumpeter’s theory of business cycles leads to a ’third approximation’ in a multi-cycle scheme of three cycles of different lengths: Kondratieff cycles of about 55 years, medium term Juglar cycles of about 9 years and Kitchin cycles of approximately 40 months. It is relevant to note that innovation and diffusion are important in Schumpeter’s theory of business cycles as they create a ’bandwagon’ effect of imitators following the initial innovators. Furthermore, the creation of new industries based upon very important innovations such as railways, electricity and automobiles are to be understood as the origins of the long-term cyclical movement of the economy.

[4] Fortunately there are many helpful ’summaries’ of Schumpeter’s theory of business cycles, for instance Clemence and Doody (1966), Sylos-Labini (1984), Hansen (1951) and Fels (1964).

A final topic for this outline of Schumpeter's general theory of innovation and economic development which needs some clarification is the economic impact of technological development in general. In Schumpeter's writings before CSD, technology, defined as a body of rules for scientifically mediated knowledge to achieve practical goals, and science are both exogenous factors whereas innovation through entrepreneurial activities is an endogenous factor. It appears that Schumpeter was not interested in understanding technological development unless it entered into the sphere of market exchanges (BC, p.84 ff.). The picture becomes somewhat more complicated if notice is made of some modifications in Schumpeter's theory of innovation, as for instance found in CSD. From an early interpretation in a model of largely entrepreneurial innovation one notices a change towards a model of large firm-managed innovation where technological knowledge, including science-based inventions, becomes endogenous to large companies, see also Freeman et al (1982), Mason (1951), Philips (1971), Rosenberg (1986) and Scherer (1992). In stressing the relevance of large science-based companies Schumpeter made it possible for technology to become more endogenous to his theory of economic development.[5]

Innovation and new combinations

Schumpeter introduced the concept of innovation to explain the change-over from routine economic growth to economic development through the carrying out of so called new combinations. The description of innovation as carrying out new combinations is given in most of the literature on Schumpeter; here, the original text will be reproduced to demonstrate the 'width' of his concept as:

"1) The introduction of a new good--that is one with which consumers are not yet familiar--or a new quality of a good.

2) The introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially.

[5] This topic ties-in with the debate about the so-called Schumpeter hypotheses on market structure, firm size and innovation with large corporations dominating technical change. The topic as such goes beyond the objectives of this paper, see Kamien and Schwartz (1982), Baldwin and Scott (1987), Cohen et al (1987), Cohen and Levin (1989), and Scherer (1992) for an assessment of the debate.

3) The opening of a new market, that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before.
4) The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created.
5) The carrying out of the new organisation of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position" (TED, p.66 see also BC, pp. 84-5).

This concept of innovation encompasses technical change, new products and processes, product differentiation, new markets, diversification, new raw materials and new market structures.

Although in most of his writings Schumpeter referred to innovation as 'new combinations', he also defined innovation "... as the setting up of a new production function ..." (BC, p.87, see also HEA, pp.1026-53). Whether this reference to production functions was helpful is, in my opinion, doubtful.[6] As Heertje (1977) recalls Schumpeter introduced various definitions of production functions such as:

a. "(...) the given technological possibilities within the horizon of producers;
b. (...) blue prints, where every element that is technologically variable at all can be changed at will without any expense;
c. (...) a 'realistic' production function, to be constructed on the basis of factual observations of production and factors of production, distinct from the 'logically pure' production function" (Heertje, 1977, p.100, see also HEA, p. 679, 1031-2).

It is obvious that all definitions of innovation given by Schumpeter, whether related to new combinations or production functions, are rather broad and vague. I think that all this reflects his 'struggle' with the complexities of technological development. Therefore, it should not come as a surprise that Schumpeter's attempt to define innovation has been criticized by many authors. These criticisms of the different definitions as developed in his writings range

[6] The reference to production functions is, however, quite understandable from the perspective of Schumpeter's attempt to keep his work acceptable to the neo-classical paradigm of that era.

from ’fuzzy’ and too broad on one extreme to too narrow, as it only relates to new firms and new entrepreneurs, on the other; see Clemence and Doody (1966, pp. 39-50) for an overview of criticisms.

The criticism of a too narrow definition, restricted to new firms and new entrepreneurs seems inappropriate if we consider Schumpeter’s description of innovation in the broader context of his subsequent writings. This criticism might, however, have some relevance to his concept of innovation in TED, where he referred to the role of new firms as innovators, although even there Schumpeter explicitly referred to that role in ’competitive capitalism’ and not to the later stages of what he referred to as trustified capitalist development (TED, p. 67). In his subsequent publications large, existing companies became more important as innovators in modern capitalism. Thus, in general, Schumpeter referred not only to new companies as the main source of innovation.

The objection to the broad character of Schumpeter’s definition must be taken more seriously. In that context one can criticize both the production function and the new combinations approach. A well-known and older criticism of Schumpeter’s definition of innovation as the setting up of a new production function has been made by Lange (1943). Lange argued that there is always a large number, even a possible infinite number, of ways of changing existing production functions. According to Lange only those changes are relevant which will lead to an increase in the maximum effective profit (Lange, 1943, p.21). It appears that Lange understood the issue in precisely the way Schumpeter apparently meant to avoid. The latter stressed that his definition is not "... equivalent with ’change in method’ or ’change in technique’ of production ..." (BC, p.87). In other words, Schumpeter’s definition of innovation did not refer to a shift along the production function but a shift of the production function itself. Lange is clearly mistaken in assuming the availability of an almost infinite number of changes of production functions. Technology does not refer to an infinite set of options and solutions to technical problems. As shown by many authors who study technological change, in practice these options are, given ’path dependencies’ of technological development, limited in general and even more restricted to individual companies, see e.g. David (1985), Dosi (1982), Dosi, et al (1988), Freeman (1984), Nelson and Winter (1982), Rosenberg (1982).

There are some similarities between Schumpeter's discussion of innovations in terms of production functions and modern 'heterodox' theories of innovation. In the early eighties a growing number of publications began to discuss innovation in the light of so-called technological paradigms, technological regimes, basic designs and the like. Rosenberg's (1982) meta-production function, Nelson and Winter's (1982) technological regime and natural trajectories, Dosi's (1982) technological paradigm and technological trajectories, Freeman and Perez' (1988) techno-economic paradigm and Sahal's (1981) technological guideposts are all notions that attempt to catch the cumulative nature of technological development and the set of heuristics that guide the process of search within technologically mediated knowledge. Each of these concepts appears to have something in common with Schumpeter's meta-production function-like understanding of innovation in terms of 'technological possibilities within the horizon of producers'. However, the recent work mentioned above is much richer in its analysis of the internal dynamics of the process of innovation, as shown by many case studies, industry surveys and historical analyses, than the abstract treatment by Schumpeter. Also most of these 'new' concepts are much more developed in terms of their perception of the interaction between social, economic, scientific and technological characteristics of the innovation process. Whatever its possible shortcomings, for instance in terms of positivist properties such as prediction capacity, this stream of contemporary research on innovation and technological development, largely inspired by modern evolutionary economics, provides a much richer understanding of technological development than found in Schumpeter's attempt to introduce a modified interpretation of production functions.

I think Schumpeter's reference to new production functions as an illustration of innovation was an unfortunate choice. Regardless of the general benefits of production function analysis for economics, it has not been very successful in explaining the details and both the irregular and regular character of technical change in process innovations, let alone product innovations. Furthermore, Schumpeter's definitions of production functions are somewhat vague compared to more generally accepted definitions which only adds to the confusion in attempting to understand innovations as new production functions.

As mentioned above, Schumpeter's definition of innovation as 'new combinations' is also rather broad as it relates to technical, market and organizational aspects of the subject. All three aspects are important for understanding the complexity of innovation, but it could be useful to keep them separate. A preliminary qualification can be made by 'narrowing' the concept in abstracting from organizational and market structure related elements. Then, innovation would be limited to new goods or an improvement of the quality of a good and new or improved methods of production, in other words, product and process innovations. These 'technical' innovations have to separated from organizational innovation and changes in the market structure, although it is obvious that these phenomena are related and influence one another.

Schumpeter's focus on innovation as a new combination without too much attention for pre-market conditions of technological development resulted not only in the abstraction from early phases of technology, it also meant that minor technological changes were somewhat neglected. Also Schumpeter's understanding of innovations as more or less radical changes with a great impact on sectors of industry and business cycles made minor day-to-day technical improvements apparently less important. In particular in TED technical changes based upon existing routines were seen as irrelevant. In CSD routinized innovation becomes a more important factor in the role large companies play, but the issue as such is not discussed thoroughly. In that sense, compared to modern theories of innovation, Schumpeter's concept of innovation is also too restricted as it abstracts from subsequent steps of technical improvement once an innovation has been introduced. In that context one can also point at a wide range of theories that address learning capabilities in companies that affect both the pre-introduction and the post-introduction period of innovations. Building on Arrow's (1962) seminal contribution to the economics of learning by doing, recent theories of innovation stress the importance of organizational learning as 'learning-by-learning, learning-by-doing, learning-by-using' through which companies develop knowledge that is broader than just R&D. These learning economies associated with the innovation process within firms are characterized by their cumulative, continuous, and collective nature (Lazonick, 1991). Such a broader conceptualization of organizational learning pictures the process of accumulation of knowledge within companies, the interaction with their environment, and the organizational dynamics of the knowledge generating process, see Cohen and Levinthal (1989), Dodgson

(1993), Dosi (1988) and Rosenberg (1976). In that sense these recent theories of innovation supplement Schumpeter's theory of innovation when stressing the dynamics and spill-overs of innovative activities introduced and developed within companies.

Entrepreneurs and innovation

Schumpeter's attention for the role of the entrepreneur can be seen in a longstanding tradition of economists who paid attention attention to entrepreneurial functions in economic development. His ideas are in particular influenced by a wide variety of economists like Marshall, Wicksel, Clark, Bentham, the Austrians, Say, Walras and early French economists, see CE, p.64 ff, Johnson (1986) and Marco (1985). In the literature Schumpeter's theory of modern economic development is frequently differentiated into two periods: a period of entrepreneurial capitalism and a period of modern, trustified capitalism where entrepreneurs lose their function (Freeman et al, 1982; Kamien and Schwartz, 1982; Philips, 1971). However, in Schumpeter's own theoretical development it seems there is a much more gradual change in the role entrepreneurs play. As early as in TED Schumpeter recognized that in modern capitalism large companies were becoming more and more important as innovators. These different roles for the innovating entrepreneurial companies and the 'great combines' in stimulating innovation were seen by Schumpeter as "... the water-shed between two epochs in the social history of capitalism" (TED, p.67), i.e. that of 'competitive' versus 'trustified capitalism'. In one of his last and relatively unknown publications (CE) Schumpeter returns to the topic of entrepreneurial activities, but now in the context of the role of the entrepreneur within large companies. These remarkable changes in the development of Schumpeter's theory of entrepreneurship justify some further attention.

Schumpeter presented his theory of capitalist development of the entrepreneurial era, which probably coincided with the nineteenth century, most clearly in TED. There, entrepreneurial activity was seen as a third factor of production, next to labour and land. In the explanation of the circular flow labour is differentiated by its direction: creative labour is of a higher order than directed labour (TED, p.20). Differences between other categories of labour such as intellectual and manual labour or skilled and unskilled labour are all neglected as irrelevant to Schumpeter's economic analysis. The decisive element of creative labour is embodied in

the entrepreneur. The entrepreneur can be described as the only agent of economic change in the circular flow. In a sense the entrepreneur is the personification of innovation, i.e. the individual who carries out new combinations. It is important to note that according to Schumpeter entrepreneurs are by definition neither inventors, capitalists or a social class. Although, all three can be combined in one person, this combination is unnecessary. Therefore Thirtle and Ruttan (1987, p. 3) are mistaken if they understand Schumpeter's entrepreneur from TED as an inventor. As explained above, at that stage of Schumpeter's theoretical development, invention itself is an exogenous factor, it is the concrete innovation and the innovative capacity of the entrepreneur that count as endogenous factors of economic development. Also Elliott, in his otherwise valuable contribution, misses the point in stating that "... successful entrepreneurs 'become' capitalists in Schumpeter's analysis ..." (Elliott, 1983, p. 286). According to Schumpeter successful entrepreneurs might become capitalists but they stop being entrepreneurs once they fail to continue to innovate and (re)turn to capitalist routines (TED, p. 78).

In the early version of Schumpeter's theory in TED capitalists are either owners of companies which maintain their existing routines or bankers who provide credit to the entrepreneur. In Schumpeter's 'system' innovations are introduced by entrepreneurs and financed through bank credit and not savings. Credit is important for economic development as a change from the circular flow. It enables the potential entrepreneur to actually become one and, as 'the typical debtor of capitalist society' to reorganize the existing combinations (TED, p.95ff). In stressing the role of the entrepreneur as innovator and debtor Schumpeter presents a definition of the entrepreneur in which risk-taking is less essential as compared to other well-known theories of entrepreneurship, in particular those in the tradition of Say and Knight (Marco 1986). For Schumpeter the entrepreneur is the true and only economically relevant change-agent of a pre-trustified capitalist society. The Schumpeterian entrepreneur is, partly depending on the definition of rationality in a broader or narrower sense, not necessarily seen as a rational economic subject. Elster (1983) has characterized Schumpeter's entrepreneur as both a rationally and irrationally motivated economic agent. The entrepreneur's behaviour "... is rational in the sense of successfully exploiting the objective possibilities of innovation, yet irrational in that he is ridden by a demon who never lets him be satisfied by results" (Elster, 1983, p.l20). Santarelli and Pesciarelli (1990) discuss the rationality of Schumpeter's

perception of entrepreneurial activities in the broader Nietzschian tradition where the consciousness of the energetic entrepreneur and his proactive behaviour is understood as rational behaviour. It is obvious that the understanding of rationality in various schools of thought or philosophical traditions, as explained by the perception of Elster and Santarelli and Pesciarelli, shows remarkable differentiation. However, in both interpretations of the rationality of Schumpeterian entrepreneurial activity, the entrepreneur as the only agent of economic change is a far cry from the generalized economic maximizing subject in textbook neo-classical economic theory.

For understanding Schumpeter's perception of modern capitalism the later version of his theory of the firm is more appropriate. In CSD Schumpeter pictures the diminishing importance of the entrepreneur who loses his/her function as the agent who changes existing routines. Economic development gradually becomes 'depersonalized' and 'automatized'. Consequently, "... innovation is being reduced to routine. Technological process is increasingly becoming the business of trained specialists who turn out what is required and make it work in predictable ways" (CSD, p. 132). The disappearance of the entrepreneur as the only change-agent in capitalism, as pictured in CSD, has significant consequences. Schumpeter, like Weber (1921), stressed that rationalization and bureaucratization had become major trends in modern capitalist society (Foster 1984). A final consequence of these features of modern capitalism is that, according to Schumpeter, it evolves towards a socialist society as the 'bourgeoisie' will lose its social and ideological defender personified in 'the' entrepreneur. The issue as such goes beyond the aims of this paper but an often quoted and clarifying passage can reveal much of Schumpeter's far-reaching conclusions.[7] There it is stated that: "... if capitalist evolution - 'progress'- either ceases or becomes completely automatic, the economic basis of the industrial bourgeoisie will be reduced eventually to wages such as are paid for current administrative work excepting remnants of quasi-rents and monopoloid gains that may be expected to linger on for some time. Since capitalist enterprise, by its very achievements, tends to automize progress, we conclude that it tends to make itself superfluous - to break to pieces under the pressure of its own success. The perfectly bureaucratized giant industrial unit not only ousts the small or medium-sized firm and

[7] Political and economic developments in the present era seem to falsify Schumpeter's 'fears'.

’expropriates’ its owners, but in the end it also ousts the entrepreneur and expropriates the bourgeoisie as a class which in the process stands to lose not only its income but also what is infinitely more important, its function" (CSD, p. 134).

However, Schumpeter also mentions that in the world of large companies the entrepreneur is not necessarily an independent economic agent but that he or she can also be an employee of a large company with an entrepreneurial function, see CSD (pp. 74-5) and BC (p. 440). As mentioned above this particular role of entrepreneurship in modern capitalism is discussed again in one of Schumpeter writings towards the end of his life (CE). There the role of entrepreneurial skills is stressed again but now in the importance of cooperative entrepreneurship in large companies instead of the ’heroic’ creative labour of a single entrepreneur. In Schumpeter’s own words: "... the entrepreneurial function need not be embodied in a physical person and in particular in a single physical person. Every social environment has its own ways of filling the entrepreneurial function. (...) Again the entrepreneurial function may be and often is filled cooperatively. With the development of the largest-scale corporations this has evidently become of major importance: aptitudes that no single individual combines can thus be built into a corporate personality; on the other hand, the constituent physical personalities must inevitably to some extent, and very often to a serious extent, interfere with each other. In many cases, therefore, it is difficult or even impossible to name an individual that acts as ’the entrepreneur’ in a concern" (CE, p. 71,72). In other words, the role of the entrepreneur is analysed in terms of the function in a company and not necessarily as a physical person.[8] Due to the growing separation of ownership and management the entrepreneurial function within the company lies, according to Schumpeter, with the executive function of management. This emphasis on the division of ownership and executive responsibilities is largely in line with his thoughts on the entrepreneurial function explained in earlier work where, as mentioned above, owners of firms (or capitalists) as such had no substantial part to play in economic development. It remains unclear to what extent Schumpeter realised that this ’new’ collective entrepreneurial function affected his ’pessimistic’ philosphy on the future of capitalism. Its implications for the management of innovation within large companies are quite clear and as such the parallel with modern

[8] In CE (p. 71) somewhat surprisingly Schumpeter even mentions the possible role for organizations other than companies, for example the role of state agencies, as collective entrepreneurial change-agents.

theories on corporate renewal that, amongst other things, stress the importance of creativity within organizations, are noteworthy (Bartlett and Ghoshal, 1993; Johnson and Scholes, 1989; Maidique, 1980; Teece, 1993).[9]

Conclusions

To conclude that, after between about 40 to 80 years from publication of his major works, Schumpeter's contribution is outdated in some respects is, even for a somewhat peripheral sub-discipline in economics as the study of innovation and entrepreneurship, rather superfluous. The major objective of the foregoing sections has been the analysis of the role that innovation and entrepreneurship play in Schumpeter's theoretical development that covers most of the first half of the 20th century. Thereupon the value of Schumpeter's contribution could be briefly assessed in the light of the general impact of this theories and the possible linkage to modern theories and analyses.

The understanding of innovation and technological development as a major disequilibrating force of economic development has not only remained central to Schumpeter's theory, it can still influence modern economic analysis. The introduction of new products and processes plays an important role in reshaping competition in the domestic as well as in the international marketplace. It has both short and long-run effects on consumers, companies and nations through the creation and redistribution of economic welfare in a gradually expanding economic space.

Although details of Schumpeter's vision on the effect of innovation did change somewhat during the evolution of his theory these modifications should not be overestimated. Many reinterpretations, e.g. those related to the role of large firms, partly reflect what Schumpeter saw as objective developments in the capitalist system itself with large science-based companies playing a much more prominent role in the twentieth century than they could possibly play in earlier phases of capitalist development. An important side-effect of Schumpeter's understanding of the role of technological development is that it became an

[9] See also Mintzberg (1994) for a recent account of the debate on strategic planning versus creativity and entrepreneurship in large organizations.

endogenous factor in the explanation of economic development. This endogenous character of technological development returns in many modern theories, in particular in evolutionary economics, see Dosi et al (1988).

The role that entrepreneurial activities play in understanding the dynamics of innovation throughout Schumpeter's theory, from the single-person economic agent to the collective entrepreneurial function within firms in modern capitalism, are important features worthwhile to consider for modern theories of innovation. The emphasis on the creativity of collective entrepreneurial functions aimed at proactive strategies ties-in with a growing number of publications on modern theories of the firm, organizational economics, and business studies that reflect firm-specific advantages created through innovative capabilities, see Dosi and Teece (1993) and Kogut and Zander (1993). In that context collective entrepreneurship is not a magic phenomenon or a deus ex machina but primarily understood as the application of innovative capabilities based on tacit knowledge, well developed internal search routines, firm-specific skills and organizational learning.

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