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TERRITORIAL TRANSFER OF KNOWLEDGE IN TERMS OF CREATIVE DESTRUCTION

Abstract. 'Creative destruction' is one of the most important analytical tools, taking into consideration both the economic and sociological characteristics of capitalist society. According to Schumpeter, in the long term, evolution gives rise to economic development resulting from batches of innovative solutions, leading to improvements in the standard of living.

The innovation activity of firms is based on supply-side factors, hence it is large enterprises that excel in innovation since they strive to achieve a monopoly market position and above-average profits.

Schumpeter attempts to combine two elements: the spread of monopolies and the continuation of economic development, both occurring through innovation, which is far more important than price competition. The Schumpeterian 'creative destruction' permeates the main aspects of macroeconomic activity, not only in the long term, but also in the area of economic fluctuations, structural changes, or the functioning of markets. As a result, it becomes a factor determining changes in the economic order.

The purpose of this paper is to analyse the role of territories in the process of creating and using knowledge and its impact on the economic efficiency of the companies which function within their boundaries.

Regional cooperation increases the involvement of business entities in innovation activities, which translates into higher competitiveness of firms. Moreover, the awareness of the necessity of cooperation and use of innovation capital tends to grow.

Keywords: creative destruction, innovation, economic development.

Introduction

The recent growing interest in the role of innovation in economic development has prompted many theoreticians to return to the work of Joseph Schumpeter. His concept of economic and social evolution, which defines the nature and extent of the impact of innovation, has lately become one of the most frequently applied theorems of the economic sciences. The presentation of the evolution of socio-economic systems and the factors which

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shape them makes it possible to explain the formation and functioning of an economic order in a more analytical way.

The purpose of this paper is to characterise the process of 'creative destruction' against the theoretical assumptions of Schumpeter's work and to indicate its main constituents that influence the performance of transfer of knowledge. In addition there is a short conception of the role of territory in those processes.

1. 'Creative destruction': the nature of the process

The activity of modern enterprises is, to a large degree, based on the innate creativity of individuals who continually discover new objectives, tools, or knowledge, and endeavour to find a way to apply them in economic practice. This approach is closely associated with the conditions of 'creative destruction', a phenomenon that provides impetus to the development of markets. 'Creative destruction' clearly harks back to German Romantic philosophy, which glorified the power and delight of human creation (*Schopfungskraft*). It also reflects the Renaissance idea that man was created in the image and likeness of God, and emphasises the joyful duty to be an inventor [Reinert, Daastol, 1997, pp. 233–283]. In the 20th century, the same idea was used in Schumpeter's conception of an entrepreneur (*routine breaker*), who becomes an innovator motivated not merely by a desire to gain profit, but also by an intrinsic need to act [Reinert, Reinert, 2012, pp. 5–7]. Being an entrepreneur entails being capable of conducting efficient business activity. Entrepreneurship means a natural capacity of human beings to respect and discover the opportunities for profit that appear in the market, and to take advantage of them [Kirzner, 1979, p. 54] or, in other words, people's ability to generate and develop new economic strategies.

Also Sombart's writings include references to 'creative destruction', as well as to Goethe, when characterising the phenomenon of creation. Many themes present in the German economics of that era are concerned with the idea of creation and the need for a holistic approach [Schumpeter, 1960, ch. 2], which, according to Helander, allows one to call it 'Faustian economics'. To a significant extent, these considerations can also apply to modern entrepreneurship and innovation.

Schumpeter's concept draws from the German economic thought of the 19th and 20th centuries, i.e. from before the *Methodenstreit* period. Besides, certain affinities can be noticed between the ideas of Schumpeter and those of Marx, Schmoller, Simon, and the aforementioned Sombart.

In the *The Communist Manifesto*, Marx and Engels specify the most important characteristic of the capitalist economy in the following manner: '*The bourgeoisie cannot exist without constantly revolutionising the instruments of production, and thereby the relations of production, and with them the whole relations of society. Conservation of the old modes of production in unaltered form, was, on the contrary, the first condition of existence for all earlier industrial classes. Constant revolutionising of production, uninterrupted disturbance of all social conditions, everlasting uncertainty and agitation distinguish the bourgeois epoch from all earlier ones.*' [Marks, Engels, 1848, p. 5].

Although Schumpeter was in entire disagreement as to the sources and role of revenue and ownership in capitalism, it was from Marx that he derived his theory of the erosion of profit margins during diffusion of innovations. However, in a later period he sided with Menger and his *Methodenstreit*, as well as repeatedly, throughout his academic career, acknowledging Walras' Law [Freeman, 2001, pp. 19–24].

Schmoller engaged in a long-standing methodological debate with Menger, contesting the abstract-deductive methods of inquiry advocated by the Austrians, and proposing instead the more holistic, empirical, and inductive approach of the historical school. He strongly emphasised the necessity to comprehend and heed the historical and social context of the economic histories of particular nations. But at the same time, he questioned the existence of objective economic principles, based on logic and on a mechanistic approach to economic phenomena.

According to Simon, the threat of bankruptcy and the will to keep business running lead entrepreneurs to improve their abilities to cope with hostile conditions. In his theoretical model, companies use their acquired skills as long as it helps them to maintain satisfactory results. Market competition triggers the process of innovation or imitation, which forces enterprises to seek new skills. If these prove efficient, destruction of the old organisational system ensues, and a new one emerges.

Schumpeter disagreed with Schmoller's and Simon's concepts. For him, creation (innovation) was an independent process, not one necessitated by deficits or by external factors. Innovation makes it possible to create a new system of abilities by destroying the existing one. '*Capitalism* [...] *is by nature a form or method of economic change and not only never is but never can be stationary*' [Schumpeter, 1995, p. 101].

The central facet of Schumpeterian 'creative destruction', a process strictly connected with the nature of market mechanisms, is his discussion of forms of competition capable of a definitive improvement of an economy,

both in the quantitative and qualitative sense. It is the entrepreneurial process that constitutes this explosive force which can, because of its sheer creativity, unsettle the existing order. At its heart is the technological advantage stemming primarily from the internal potential of a company, above all the potential to conduct R&D activity. This is why, according to Schumpeter, among enterprises more likely to innovate are large companies, monopolists, as well as those which have higher innovation potentials [Schumpeter, 1995, pp. 129–130].

New technological phenomena are born of dynamic, innovative competition, and not a static price-based rivalry. Simple price competition merely results in cheaper consumer goods. Meanwhile, non-price mechanisms guarantee greater usefulness of future products and their better utilisation. This allows for the co-existence in the market of a mixture of cheap, technologically inferior goods and more expensive, but also more innovative, ones. This kind of competition outlines the development paths for enterprises, which must strive towards qualitative changes and possess a potential for creating new solutions, in terms of technology, organisation, or marketing.

Schumpeter also pays attention to the lack of economic equilibrium, directly referring to the work of Walras. When no economic data undergo change, but are perfectly predicted by market entities, stationary circular flow occurs, and all activity happens automatically. No one gains any additional profits or suffers losses, because they are perfectly capable of adapting to the conditions governing the market. But the real world is different, and thus business entities have to continually adjust to new circumstances. This takes place through competition and innovation, when these two annihilate the existing state and give rise to new economic structures.

The steady state results from the system of components which form the circular flow and trigger development processes, which always have an evolutionary origin. The steady state is influenced by a number of factors that can be divided into two groups:

1) External factors, non-social in nature, such as the natural environment in which an economy operates, as well as the economic conditions: e.g. the legal or political system, historical events and processes;
2) Internal factors associated with changes taking place in the market; on the demand side, these include the changing preferences of purchasers, on the supply side: the changes regarding production resources;

As Schumpeter points out, the above factors are not capable of stimulating development, but can merely help to maintain the circular flow. Development is possible only thanks to incremental changes consisting in new ways of applying production resources (innovation).

Economic processes fall into three separate categories: circular flow processes, development processes, and the processes which interfere in this development (cyclical and structural events). Competition is all about innovation, i.e. a rivalry between novelties and older products (or processes). New offers appear at bargain prices because costs decrease. Entire markets function thanks to constant innovation-driven competition. Innovation leads to a certain kind of monopoly, but this monopoly is dynamic (transient).

Under free economic competition, the propensity for innovation becomes weaker. The bulk of what we call economic progress is incompatible with perfect competition. If it was possible to imitate the majority of products, most innovators would lose the motivation to act [Schumpeter, 1939, p. 85]. The obstacles that hinder development are not a consequence of monopoly, but of inertia or inability to overcome risks. Therefore, in a 'trustified' economy, they are not greater than in free market capitalism.

Schumpeter combines the formula of 'creative destruction' with an analytical model of economic evolution formulated in Business Cycles, according to which, the evolution of acquired skills can drive an economy to one of the following states [Andersen, Dahl, Lundvall, Reichstein, 2006, pp. 5–6]:

- Initial equilibrium: its starting point is a system relying on routine behaviour; the system reaches an equilibrium which allows its participants to operate in the market;
- Innovation: the initial equilibrium is upset when a group of innovators commences their activity; this improves the economic situation, but the stream of innovations gradually dries up since the innovative skills become depleted and new solutions are increasingly more difficult to implement in the conditions of systemic disequilibrium;
- Renewed equilibrium achieved through 'creative destruction': the innovative impulse is insufficient to benefit the economy and the process of fierce market competition begins, leading to the closure of some companies and leaving others strengthened and equipped with additional skills necessary for survival in the economic system; all this leads to the establishment of a new, better routine system.
- Economic evolution under the conditions of 'creative destruction': the system changes, shaped by the newly-acquired skills of its players; new circumstances emerge, and temporary disturbances result from innovative behaviours; this process creates socio-political reactions which may have a bearing on the functioning of the system in the future.

It can be said, therefore, that there are two aspects to Schumpeterian 'creative destruction'. First, by means of innovation, 'creative destruction'

causes a selection of firms depending on their skills. Second, it determines the extent of innovative activity of competing enterprises.

'Creative destruction' can be seen as a 'Darwinian process', involving various kinds of conflicts between the participants [Phillips, 1971, pp. 67–87], or as an opportunity to modify the business milieu (Lamarck's theory) by providing expenditure on R&D or through marketing activity [Andersen, Dahl, Lundvall, Reichstein, 2006, p. 7]. '*Many companies must collapse as a result of creative destruction, but if they withstand the storm, they can survive. They will survive, provided they lose as few production functions as possible and strive to maintain employment*' [Schumpeter, 1995, p. 90].

All the above demonstrates that there exist factors which can be used to counter the cumulative effect of destruction, both within enterprises and in state economic policy. Although Schumpeter was inspired by the theories proposed by Lamarck, his concept is frequently presented as a Darwinian model. This is because of its greater simplicity and practicability [Andersen, Dahl, Lundvall, Reichstein, 2006, p. 8].

The concept of 'creative destruction' can be perceived as a major analytical tool, well adapted to the economic and sociological characteristics of a capitalist society. Schumpeter believed that, in the long term, economic evolution contributes to an increased standard of living. It is essential, however, what socio-political reactions are evoked throughout its course. These reactions are inherent in capitalism as a driving force of human endeavour [Schumpeter, 1939, p. 55]. Innovations represent a kind of a 'rationalist attitude' which dismisses the reliance on sacred institutions and the predictability of social life. Capitalism always contains elements of unpredictability and instability, and that is why it gives rise to a spontaneous economic order [Andersen, Dahl, Lundvall, Reichstein, 2006, p. 9].

2. The importance of technological factors in the development of new market order

The structural changes and development of national economies are inherently connected with progress in technical research. It is the driving force in the globalisation process but at the same time it is itself driven by globalisation. The influence of technical research on national and global economies can be investigated at different times throughout history. According to J.A. Schumpeter [1939] the period between 1775–1845 was dominated by water energy, textiles, and iron, the period between 1845–1900 by steam energy, railroads and steel. The years between 1950–1990 were characterised

by the development of petrochemistry, electronics, aeronautics. The present wave of innovation which began in the USA at the end of the 1980s propelled by new resolutions in the fields of the digital systems, software, and the integration of transmitting information thanks to new mediums (and also by impulses caused by these changes in other fields such as biotechnology, engineering materials) [Gordon, 2000].

At the beginning of the industrial revolution, progress in research technology had an endogenic character because it occurred in the material production process and relied on the current higher standards of efficiency. Starting from the second half of the 19th century its character changed radically to the exogenous which was the result of R&D activity. After World War II the sphere of R&D began to separate creating a new sector in the national economy, in developing technological innovation for industry, agriculture, services, medicine, and protection of the environment [Lukaszewicz, 2001].

The modern wave of innovation has led to significant changes in the quality of the World's economy [Halizak, Kuzniar, 2001]. There has been a decrease in the utility of materials and the utility of energy by the industry. During the last two decades the dynamics of the increase in global production is higher than the utilisation of the natural resources and energy. This means that economic growth occurs through negative income flexibility of the demand for natural materials and energy units. In consequence this leads to a decrease in the demand for natural resources and energy units in the world economy, limiting the income of countries specialising in their export.

There has also been a decrease of importance of the labour force as a source of comparative advantage. Differences in salaries in each country had been until recently a factor that conditioned decisions about the location in the world's market. Due to this fact the main benefactors were countries specialising in traditional and labour-intensive goods.

In the 1980s in the developed countries, automatic technologies started to be widely used in traditional branches of industry (clothes, textile, shoes, steel, applied electronics, and the car industry). As a result those branches became intensive as far as technology and capital is concerned. This led to their development and functioning even in countries with high labour costs. In those conditions the advanced technologies became a substitute for the labour force offered by the developing countries.

The connection of innovation in the field of digital technology and data transmission (especially via the internet), decreases costs and the time of communicating, and shortens the distance between people and societies,

contributing in this way to creating a global information network. This creates a new quality since information has become a productive factor of production, along with capital, labour, land, and the other factors determining economic growth. Thanks to the diffusion of innovations there is an equality between technological capacity in companies localised in different countries, thus technological parity increases. The same tendency exists on the level of countries and is described as the convergence of technology. In the process of innovation diffusion, a key role is played by transnational corporations through the geographical integration of the diffused functions/operations of a scientific-developmental character and their submission to the global strategy of their national economies.

In spite of the presence of the above mentioned phenomena, the world's innovation potential is strongly varied dimensionally. This accounts for the division of the world into three groups of countries:

- technological innovators, inhabited by one third of the world's population
- technological adopters – inhabited by half of the world's population
- the technologically excluded, cut off from the introduction and spread of technologies.

Among highly-developed countries and the developing countries there are technological gaps which means the coexistence of economic subjects, technologies, and products representative of different levels of technological advantage. Technological gaps are an element of market competition. Thus they create an incentive for using this advantage by leading companies or economies. On the other hand there appear incentives for imitating innovative processes and importing technologies. Countries which are on a lower level of technological development may move on to a higher level through the processes of learning which include:

- learning-by-using, that is, increasing the effectiveness of production by using more efficient and complex systems of production and management.
- learning-by-interacting, based on the interaction of a producer and a client for modernisation and raising the standard of the efficiency of the product.
- learning-by-learning, when the ability of the company to adopt new technologies depends on earlier experiences in learning.

From a certain point of view, innovation is a primary economic realisation of an invention, i.e. launching it into the market. Schumpeter classified technological change into (the so-called Schumpeter's Triad) 1) invention, 2) innovation, and 3) imitation. An invention requires technology input,

then it can be transformed into technology output and take the shape of process or product innovation, which is diffused across business companies, and industry branches, within a national economy or throughout the entire global system. An invention can be evaluated by juxtaposing the amount of R&D expenditure to the end-result: the number of licenses or the level of know-how [Schumpeter, 1939, pp. 93–95].

Schumpeter characterised innovation as '*industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one*' [Schumpeter, 1995, p. 83], and claimed that capitalism has never been and, more importantly, will never be a static system. Change is the only constant in entrepreneuring.

Innovation has its reflection in a new function of production, i.e. creation of new business centres with modern technical equipment, the modernisation of existing ones, both requiring considerable amounts of time and resources. To a certain extent, Schumpeter refers to Gabriel Tarde's laws of imitation, according to which a traditional society follows established routines, whereas a modern society modifies reality through inventiveness. It is an individual, not a crowd, that creates inventions and makes decisions about their applications [Rogers, 1962, p. 62].

The Schumpeterian approach to innovation processes focused on the supply side, which allowed him to restrict his perception of technological progress to the purely technical aspects of R&D. He identified, therefore, technological progress with an increase in global productivity of production factors: that is, with a situation when production growth is greater in comparison with the growth of expenditures.

Innovations are stimulated by technical possibilities; changes in productivity by increases or decreases in innovativeness, i.e. supply factors. On a macroeconomic scale, this causes the development of those branches where capital productivity growth becomes increasingly easier and less costly (it lessens the effect of the law of diminishing returns). Moreover, the pool of available production techniques which serves as the basis for investment growth remains undepleted.

On a microeconomic scale, the supply approach implies that it is the R&D staff that initiates innovative patterns. They search for ways of commercialising the effects of innovation, which has two significant consequences:

– Enterprises with stronger R&D capacity have an edge over those which have a smaller R&D potential because a higher number of research workers are better able to take advantage of progress in the area of basic research for economic purposes;

– Assuming that the R&D potential is similar, innovative activity will be greater in those fields in which appropriate scientific background (in basic research) develops faster.

The character of technological change is determined by factors which influence the extent and pace of the growth of technical knowledge. Schumpeter emphasises the supply-side sources of innovation (external in relation to the enterprise) because there exists in an economy a steady stream of inventions made by relevant research or scientific entities. This, in turn, is supposed to stimulate economic development by building a new economic structure and market order. The market and competition among businesses are the main factors of this process.

Being based on the function of production, Schumpeter's theory of innovation did not have an analytical, but only a general significance. It became the fundamental model of the neoclassical theory of growth and technological progress, a category used to characterise the particular changes in the relationship between production factor outlays and their impact on production volume. Its significance was most emphatically expressed by R. Solow, for whom a shift in the production function meant a case of technical progress [Solow, 1957, p. 312].

Every important innovation is embodied in a 'New Firm', which stems from the economic depletion of production means and tools. The degree to which these are used up determines the pace and range with which new solutions are introduced. The functioning of this type of companies is not of a permanent nature and largely depends on their involvement in the innovation process. Innovation is associated with the appearance of new persons whose skills enable firms to venture into so far unexplored fields of activity. In economies there is a fairly strong social resistance to innovations which obliterate the current socio-economic structures. If a 'New Firm' is established, this resistance is less pronounced. In a corporate structure (oligopoly), innovations are carried out by the existing firms, and in particular their managing personnel [Schumpeter, 1939, p. 95].

The innovation process can also be divided into: supply-side innovations, based on the neo-classical theory of growth; and demand-side innovations, derived from the assumptions of post-Keynesian economics. The supply-side model, which, as was already mentioned, is close to the Schumpeterian concept, implies the necessity to pursue R&D projects, which will translate into innovative products. The companies which possess sufficient R&D capacities become innovators who are at the cutting edge of technological development and pave the way for new economic structures. As Schum-

peter claimed, only large companies are capable of creating the innovation potential of an economy.

Meanwhile, according to the demand-side theory, the most crucial role in a company is played by the marketing personnel. Innovations are treated as a response to new economic opportunities for maximising profits. The entities which obtain them must strive to increase their capital equipment, thus ensuring higher revenues for those suppliers who offer new or improved technologies. The demand approach stresses the role of large firms with sound R&D backgrounds since more numerous research staff means faster and more efficient finding of innovative solutions that enable companies to satisfy the market needs identified by the marketing departments.

In view of the above, one can distinguish three elements comprising the process which reflects the diversification of the directions and absorption methods of innovation effects:

- The influence of technical changes will take place along different paths and at different levels: from production process to overall economic effects;
- The nature of these changes evolves with the passage of time;
- Also the entities which take advantage of innovation will change.

This implies that every company has their own individual way of reaching the effects of innovation. It can result from both demand and supply factors. Moreover, the innovation process is adjusted to the conditions currently governing the market and its participants. The changes give rise to a new structure of company operations, achieved thanks to lower production costs and the benefits obtained from new technologies, as well as to a new overall economic order related to the emergence of a new market.

The aforementioned classification refers to the Schumpeterian theory by treating innovation as technical and organisational change aimed at achieving a new, more advantageous state (economic order). From the point of view of the discussed problem, the most vital thing is to grasp the essence of the technical changes included in processes and products and the way in which these changes impact the economy. The level of R&D expenditure, i.e. the possibility to create new solutions, is the major factor behind technical change, whereas the number of implementations and the level of total factor productivity (TFP) are the measures that reflect its effects. Both of these categories make up a uniform innovation process: from basic research to various changes in production [Clark, 1985, pp. 95–96]. R&D expenditure must be clearly differentiated from non-innovative activity (e.g. routine).

Research and development efforts are to provide an impetus to particular enterprises, industries, or economies. R&D investments determine the

development of both product and process innovations because the lowering of costs is frequently accompanied by changes in the combinations of manufactured products, whereas new products often require new technical equipment. In production activity, both types of innovations are so closely intertwined that any distinction between them must be purely arbitrary. Nevertheless, it is possible to distinguish new methods of producing traditional goods from old methods of manufacturing new products.

3. Territory as a factor of knowledge creation and transfer

A territory assumes the nature of a genuine 'creative power' which strengthens the capabilities of individual companies. The territorial dimension is a kind of required reading which explains ways of understanding and acting on economic complexity [Rullani, Beccattini, 1993, p. 28]. The logic of regional systems concerns the ways in which enterprises bond with their environment. A regional milieu provides resources that substantially complement the production capacities of companies, i.e. labour, entrepreneurship, infrastructure, culture, or institutional liaisons.

In a regional economy, there develops a tacit knowledge, born of the experience and skills of workers, which is later transferred onto the level of the domestic and global economies and provides the basis for codified knowledge. The transfer of formal tacit knowledge happens by means of specific, systematised processes (formal language). Therefore, tacit knowledge, which is naturally difficult to formalise, becomes a kind of technical and scientific matrix that allows for the application of experience and skills in the global economy.

A territory is, on the one hand, a place where tacit knowledge becomes socialised and internationalised and, on the other hand, a system of networks comprising scientific research and the practical applications of technological solutions. Tacit knowledge is created and diffused across a given territory through social processes, i.e. experience, observation, imitation, or practice [Pietrzyk, 2004; Gorzelak, 2005].

In order for it to arise, be transferred or applied, every type of knowledge must be based on experience. Irrespective of the ways in which it is codified, knowledge has no independent life, separate from the processes which have generated it, but functions exclusively in association with the system and the mode of its codification. The mode of codification denotes the entirety of relations, integration, language, semantics, and artifacts stemming from the processes of production, consumption, and exchange of knowledge. This

allows for interpersonal communication, attracting other entities, memorising and recording of consolidated procedures, as well as advancement and propagation of knowledge.

The resultant social interactions are matrices which represent patterns of specific attitudes or abilities [March, 1998, p. 74]. At the same time, they are a foundation and an effect of social changes from which knowledge arises and develops. They are an introduction to broader cognition as they define the manner and content of communication. What should result from all of this is procedural knowledge which will be used by entities operating beyond a given territory. In this way tacit knowledge becomes formalised and renders itself to wider utilisation.

A territory is a structure which evolves owing to knowledge, signals from the market, or the effects exerted by various types of local and regional institutions. Large enterprises treat knowledge and innovation as a hierarchical process, revolving around knowledge creation centres. A company, being a system of principles (not always formal ones) devised in the past and aiming at streamlining entrepreneurial processes, creates innovations, which themselves are sequential, based on the application of abstract knowledge. This is why regional economic systems should possess opportunities for the cumulative application of knowledge and innovation, and for the development of the complex cycle of knowledge transformation.

Territories have always played a key role in entrepreneurial reorganisation, which derives benefits from social division of knowledge. As a result, companies can continually improve organisational, technological, and market solutions, in the longer period of time leading to knowledge transfer and innovation diffusion [Grandinetti, 1998, p. 89].

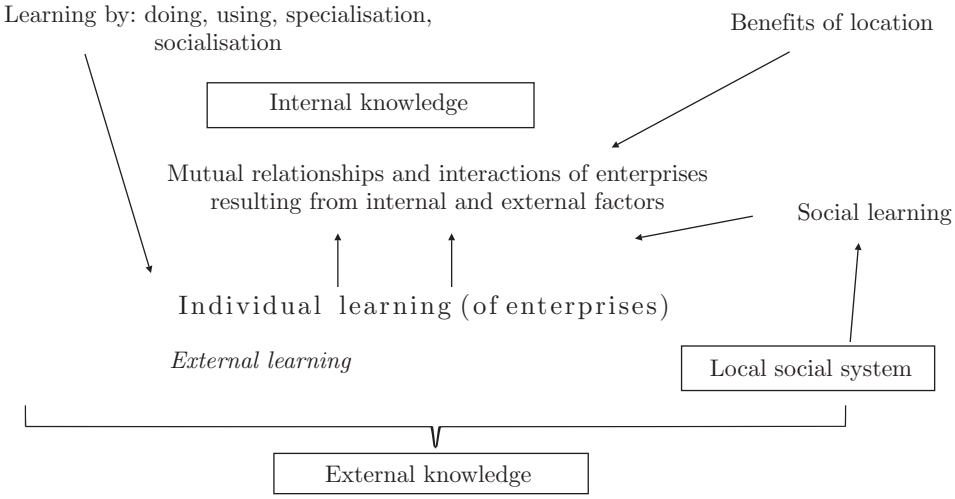
In regional economic systems the spatial proximity of small and medium-sized enterprises gives rise to the creation of specialised areas characterised by highly developed interactions. Provided that, additionally, there exist close social and institutional interconnections, the process of cluster creation can ensue. If, moreover, there exist mutual trust relationships as well as informal and tacit knowledge flows, the so-called innovation environment comes into being.

Knowledge generated in an innovation environment spreads through: the relations among clients and recipients, producers, and users; the links among enterprises; the flows of employees; and the creation of new companies [Salmi, Blomqvist, Ahola, Kylahejko, 2001, p. 20].

Innovation results from R&D expenditure and its skilful exploitation by human capital. This simple model, however, ignores the influence of location or territory on the type of relationship taking place among the entities.

Proximity boosts the ability of companies to exchange ideas and helps them gain requisite knowledge [Feldman, 1994, p. 21]. Thus, when we take local environment into account, the attitude to knowledge and innovation changes. A company that is deprived of an environment and of the relationships with other enterprises is incapable of taking full advantage of the available knowledge; companies and their local milieus form a system of relationships which make it possible to considerably increase the innovative or technological capacities of the local firms [Dosi, Freeman, Nelson, Silverberg, Soete, 1988, pp. 47–49].

Figure 1. Learning and knowledge flows in local economic systems



Source: own work based on [Albino, Shiuma, 1999, p. 8].

This model can be modified and recorded as follows [Jaffe, 2003, p. 9]:

$$I = \beta I_{R\&D} \cdot \beta_1 \times U_B \cdot \beta_2 (U_B \cdot G) \cdot \delta,$$

where $I_{R\&D}$ denotes private expenditure on R&D, U_B – research conducted by universities and research units, G – the geographical distance between university research centres, research units, and private R&D units.

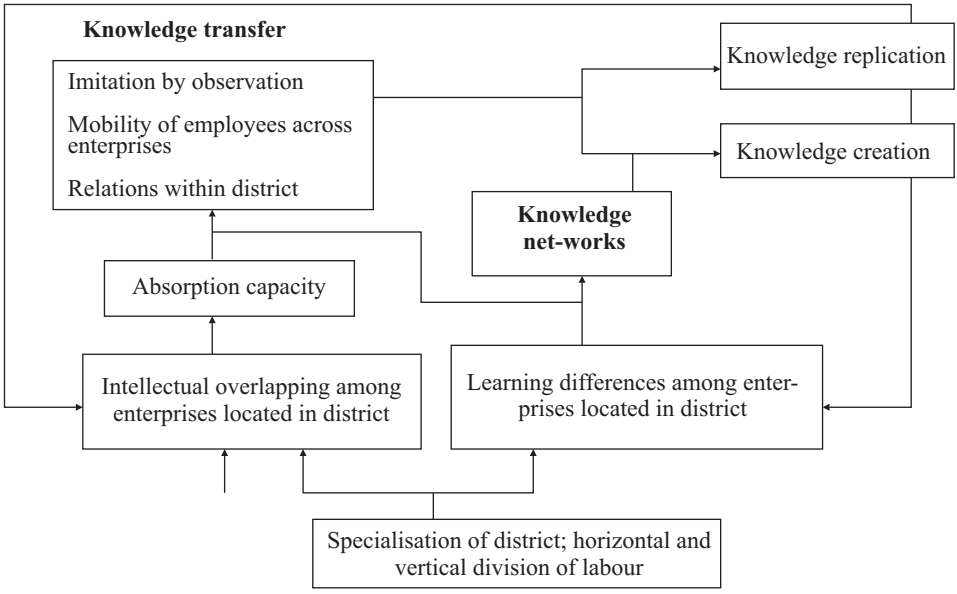
This model departs from seeing an enterprise as a point of reference in research into innovation and focuses on enterprises and their environment: research centres, universities, as well as other companies. It can be assumed that a geographical unit – a region or a local system – becomes a research unit. Therefore, appropriate location can have an impact on the economic results of an enterprise.

The mechanism of obtaining knowledge by enterprises within the framework of local economic systems can be divided into two parts: 1) learning by individual companies, and 2) learning through relationships with other enterprises. Individual learning can take place along one of the following four paths: learning by doing, learning by using, learning by specialisation, or learning by socialisation [Nonaka, Takeuchi, 1995, p. 71].

While the first two paths seem to be fairly obvious, the third and the fourth require explanation. Learning by specialisation involves the implementation of just one phase of production or producing just one type of product, which leads to more efficient specialisation of particular entities [Jovanovic, Nyarko, 1996, p. 1306]. Learning by socialisation, on the other hand, means obtaining knowledge as a result of exchange of information with other local entities [Curtis, Pendakur, 2006, pp. 2–5]. Geographical closeness increases the frequency of mutual contacts among enterprises, which in turn encourages new forms of cooperation (see Figure 1) [Duffy, Ochs, 2006, p. 21].

Social learning enables small companies to jointly take advantage of knowledge and attracts transnational firms, which usually seek common resources created by groups of enterprises, and not capital owned by individual companies.

Figure 2. Knowledge creation and knowledge networks in local economic systems



Source: own work based on [Grandinetti, Tabacco, 2003, p. 17].

This can be noticed when, e.g. after a take-over, the new owner gains access to the shared pool of knowledge and local know-how. Such utilisation of an "industrial atmosphere" allows those who have just entered the market to attain specialised tacit knowledge (see Figure 2) [Lorenzon, Mahnke, 202, pp. 5–9].

The positive effect of a 'cooperation atmosphere' aids regional and local learning by means of the mutual influence of enterprises. Regional systems profit from the external environment, adapting new, innovative solutions. Moreover, companies derive benefits from relations with the more broadly understood external milieus: social, political, and economic.

The way in which new knowledge is utilised also depends on the characteristics of an enterprise: its ability to learn and to absorb knowledge. Knowledge itself, meanwhile, spreads within regional systems with the help of employees, through the relationships among entities, and through imitation. Learning differences depend on the specialisation of the local system and the division of labour that exists within it.

Conclusion

Although the notion of 'creative destruction' and its significance are acknowledged and approved by economists, it is not widely and universally known. As a result, Schumpeter's achievements cannot be fully employed in the various areas of modern economies (economic policy, law). Only very seldom are the premises of 'creative destruction' applied to analyse the contemporary determinants of economic growth.

The Schumpeterian 'creative destruction' process demonstrates that innovative advantage is the main source of economic growth and development. The ability to achieve this kind of advantage is possible thanks to the stepping up of innovation activities by gaining a monopolist position. Large companies are the most efficient creators of innovation, being able to incur substantial expenditure on R&D.

Those economies which are open to disruptive innovation and are ready to embrace 'creative destruction' have better opportunities for a dynamic economic development. This happens through changes in production structure and the creation of a new economic order based on innovating companies. Schumpeter saw changes in the capitalist economy as an intermittent rather than continuous process. It results from the novelty of applied technological solutions and the consequent destruction of the current economic order.

Due to competitive pressure, innovations appear and the process of their imitation begins. New solutions are diffused more and more widely, bringing about an economic boom. In the long term, the extraordinary gains vanish and the interest in a given innovation gradually declines. The economy enters a crisis mode and the need for a new breakthrough arises. This takes the form of a business cycle based on technological shocks.

To sum up, from the point of view of the dynamics and efficiency of development processes, 'creative destruction' is a beneficial phenomenon. It contributes to the modernisation of economies, helps to gain technological advantages, and ushers in such structural changes which reflect the increasing level of innovation

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