An Evolutionary Interpretation of Technology Business Incubation

ZOLTÁN BAJMÓCY
University of Szeged, Faculty of Economics and Business Administration
Institute of Economics and Economic Development
H-6722 Szeged, Kálvária sgt.1
Hungary
E-mail: bajmocyz@eco.u-szeged.hu

Abstract

The change of today's learning-based economy is often considered to be evolutionary. Technology business incubation (TBI) is ultimately an intervention into this evolutionary process, especially into the course of industrial change. This raises theoretical challenges in the interpretation of TBI: we need to understand how the evolutionary character of the enhanced process influences the role and scope of the intervention. However the international literature of incubation hardly addresses this issue.

Recent paper attempts to adapt the concepts of evolutionary economics to TBI. This approach allows us to understand the different role and scope of TBI in the different situations of industrial change. By influencing both new variations and the selection environment TBI has a niche creating function during the emergence of new innovative industries. The evolutionary interpretation disapproves the myth of fully informed and rational policy makers. TBI is a "trial and error" process, hence it becomes necessary to create mechanisms that provide feedbacks from the effects and that are continuously able to select out the unsuccessful programme elements. This can be achieved by applying the "facilitate the market" approach of TBI.

Keywords: technology business incubation, evolutionary economics, industrial change, niche,

1. Introduction

The development of the regions occurs by the transformation of the economic structure, by the diffusion of new productive (innovative) industries that provide a high income level. Several underlying theories of regional and local economic development reflect to this by putting certain industries into the focus of examination: economic-base theory (basic sector), growth pole theories (growth pole industries), product cycle theory (innovative industries) (Malizia – Feser 1999, Stimson et al 2006, Blekely – Bradshow 2002). In this restructuring process those small and medium-sized enterprises (SMEs) that are capable of catalysing the regional economy owing to their *high growth potential*, or their *role played in the innovation system*, or their *participation in the inter-regional trade* (these three are usually related) have

an outstanding role. However in the early phase of their life span these firms face such difficulties that may lead to their failure.

Would the survival of some of these small enterprises accelerate the development of new "knowledge-based" industries? Would the support of the "weak but promising" firms recover through the later growth? Although this is theoretically not at all obvious, the answer given by the practical economic policy is fairly spectacular, which can be proved by the fast-rising number of business incubators. By today business incubators have become an integral part of the economic policy toolbar in numerous developed and developing (and in almost all of the European) countries (CEC 2002, UN/ECE 2001).

Although there are numerous approaches in the theoretical literature and in the economic development practice to define business incubation (Rice – Matthews 1995, Barrow 2001, Carayannis – Zedtwitz 2005), there are certainly common elements of interpretation. In recent paper we refer business incubation as *complex services and special environment provided temporarily for start-up enterprises with the aim of improving their chance of survival in the early phase of the life span and establishing their later intensive growth*. The term *incubation* refers to the process of support, while *incubator* stands for the organization and infrastructure (most often a building, a group of buildings or a park) that are set up for these purposes.

In recent years the intensification of a spectacular process gave new dynamism for business incubators: *the increasing participation of universities in local economic development* (Goldstein – Renault 2004, Etzkowitz et al 2000, Mian 1997). The frequent application of incubators and the active role of universities induced the theoretical examination of the topic. Incubation has got a place now in the "vocabulary" of enterprise- and innovation policy, and entrepreneurship. On the top of the economic policy documents, and the underlying research reports, the academic literature of business incubation has also increased in great deal. The focus has shifted from the problems of establishment and management to the economic development effects and most recently to theoretical underpinning (Hackett – Dilts 2004b). The examination of the distinct part-areas are based on different theoretical bases, hence the conceptual framework of the examination is rather heterogeneous.

The intertwining innovation- and enterprise-policy (Lundström – Stevenson 2005), and the increasing importance of universities in incubation resulted in the strong development of *technology business incubation* (TBI). TBI refers to the type of incubation where the focus group consists of innovative, mostly technology-oriented, or knowledge-intensive service sector enterprises and interactions with the academic sphere giving a substantive element of the incubation process. The pushing forward of TBI occurred in parallel with the vigorous transformation of today's spatial economic processes, it can be interpreted *as a reply for the challenges of the learning-based economy*.

As its change is considered to be evolutionary, a new approach is required for the explanation of the (spatial) processes of the learning-based economy (Storper 1997, Cooke 2002, Lengyel 2003) and the (economic development) intervention carried out into them. Certainly, this is also true for TBI, however the international literature of business incubation seems to be quite insensitive to the systematic examination of the consequences of the learning-based processes. Studies that examine certain aspects of incubation in-depth are rather insensitive to apply such an approach that analyses the incubation process from the perspective of the change of the local economy (Hackett – Dilts 2004a, 2004b). And those papers that place incubation in a wider context only occasionally take further steps beyond the declaration of the possible role of incubation in the enhancement of entrepreneurship (Sternberg 2003), in the support of start-up enterprises (Lundström – Stevenson 2005), or in the initial strengthening of local SME networks or clusters (Lengyel 2003). Thus there is a need for *analyzing the consequences that arise from the intervention to the processes of*

learning-based economy, and *to interpret TBI from the perspective of the local industrial and economic evolution* (change).

In the following sections we try to outline the elements of such an interpretation. In *section 2* we briefly review the relevant evolutionary concepts which may constitute the background of an evolutionary interpretation of TBI. In *section 3* and *section 4* we attempt to develop an evolutionary interpretation of TBI. One the one hand we examine how does the evolutionary nature of the enhanced processes (and the uncertainty and bounded rationality it infers) shape the role and scope of TBI. On the other hand we analyze how can TBI reflect to these conditions. In *section 5* we summarize the consequences of an evolutionary approach of TBI in the form of three theses and draw conclusions.

2. A brief review of relevant evolutionary concepts

As TBI intervenes into the spatial processes of the learning-based economy, integrates innovation- and enterprise-policy, and is implemented with the active participation of the academic sphere, it has such *characteristics* that outline the main fields and the conceptual background of the theoretical analysis:

- TBI fosters innovative start-up firms, thus *the process of incubation is strongly intertwined with the innovation process* that occurs in the supported enterprises.
- TBI aims at *the development of new innovative industries* by stimulating the establishment and early growth of start-up firms.

Accordingly to interpret technology business incubation we need to understand the *characteristics and spatiality of the innovation process*, the *role of highly innovative industries in economic development* and the *peculiarities of the industrial evolution*.

Evolutionary economics – building on the seminal work of Nelson and Winter (1982) – is well equipped to analyze these issues. It qualifies us to examine TBI within a framework that is able to handle the interactive feature of the innovation process, and the uncertainty and bounded rationality it implies, *both on individual and economic policy level*. Therefore the examination that builds upon the achievements of evolutionary economics seems to be capable of the interpretation of TBI within the conditions of the learning-based economy.

Recent evolutionary theorizing in economic geography (Boschma – Knaap 1997, Boschma – Lambooy 1999, Martin – Sunley 2006) provides us tools to understand the different spatial situations of industrial change. These studies attempt to analyze technical change, industrial change and regional restructuring on a unique basis, they approach the question: how do the present regional structures affect the emergence of incremental and radical innovations, which are drivers of industrial change.

In evolutionary economic geography *innovation* is an interactive and evolutionary (indeterministic, characterized by constant emergence of new variations and their constant winnowing) process, which is to a great extent dependent on resources that are region-specific, and impossible to reproduce elsewhere (Acs et al 2000, Asheim – Gertler 2005, Storper 1997). The studies of Ron Boshma provide detailed analysis on the way innovations induce the spatial change of industries. Bochma with Knaap (1997), with Lambooy (1999) and with Wenting (2004) identified two basically different situations of spatial industrial change: the world of path dependence and selection, and the world of chance and increasing returns[1].

[1] They can also be considered as situations of incremental and radical change (the evolution of an industry along a trajectory or the emergence of a new industry, a new trajectory).

In the world of path dependence and increasing returns the infrastructural and institutional environment of an industry is well-developed. Evolutionary concept like positive feedbacks (Arthur 1989), path dependency (Page 2006), technological trajectory (Dosi 1982) or lock-in play crucial role. In this case "the windows of locational opportunity"[2] are fairly closed: Innovations that does not fit the present structures of the regions are selected out, while innovations that fit into the structure have a good chance to survive and diffuse. The spin-off process (the inheritance of successful routines[3]), and the economies of localization (the spatial concentration of an industry) have important role in the evolution of the industry.

However it is improbable that they have any influence on the location of a radical innovation. In this situation there is a mismatch between the new needs and the present structures. The mechanisms that provide positive reinforcement have not been developed. Therefore the forces of selection cannot explain the evolution patterns. The situation can be characterized by unpredictability and the role of chance. The "windows of locational opportunity" are open. However certain factors may still have an influence: the economies of urbanization (great adaptability), the presence of similar activities (smaller extent of the mismatch) and the presence entrepreneurial experience (Bochma – Wenting 2004). In this situation "small historical events" through the dynamic increasing returns may have crucial role (Arthur 1989, 1990). When local mechanisms that provide positive feedbacks for an industry are quickly developed, the emerging industry can outdo its rivals in other regions (the "windows of locational opportunity" start to close). However a path may later prove to be unsuccessful, hence the early path dependence (and lock-in) is very hazardous (Martin – Sunley 2006).

While the aforementioned studies put heavy emphasis on the role of the selection (the chance for a successful innovation to diffuse in a given region), they hardly address the issue of the nature of variations. Nelson and Winter (1982), Dosi (1982) and Kemp (1998) introduces the concept of technological regime or technological paradigm. They argue that the emergence of new variations are also influenced by the present structures (Dosi calls this ex ante selection). The present regime affects the direction of the search process, certain innovations have no chance at all to emerge, because they are beyond the range of problems that are thought to be worth to deal with.

Therefore when examining the spatiality of industrial evolution we must consider certain traits. These are actually the consequences of evolutionary theorizing on the fundamental elements of a theory of TBI:

- Policy makers face entirely different challenges in the different situations of industrial change. This envisages the *different role and scope of technology business incubation in different situations.*
- Technological and industrial change is influenced by the historically developed structures of a region. These structures may enhance or hinder the development of an industry. On the top of constituting the selection environment they also influence new variations. Thus *both selection and variation must be considered when designing an intervention into industrial change.*
- The indeterministic and uncertain (evolutionary) feature of the enhanced processes infer that even the policy makers can not be fully informed about them. Hence *technology business incubation must be interpreted in the world of bounded rationality.*

[2] The phrase of Boschma and Knaap (1997).

[3] Routine is a fundamental concept of evolutionary economics: relatively constant behavioural patterns of economic actors that are rooted in the past and determine the possible behaviour (not the actual behaviour, which is also influenced by the external environment). The gist is that the routine is the only part of the behaviour that can be predicted (Nelson 1995).

3. The role and scope of technology business incubation.

Technology business incubation – as mentioned earlier – intervenes into the process of industrial change: enhances the emergence and reinforcement of new innovative industries in order to facilitate regional restructuring. We emphasized that on the one hand "small historical events" may have crucial role, but on the other hand when industrial change is path dependent it becomes hard to intervene (to alter the trajectory). This infers that TBI has different role and scope in the two basically different situations. Boschma (2005) refers to this as structural versus localized policy making.

In the case of *structural policy making* (radical change) the new requirements do not fit the present structure. The potential effects of the intervention are significant. The fostering of new variations can be successful, because several potential solutions may become the basis of a new trajectory. *In this situation technology business incubation* as *"small historical event"* may generate significant effects. TBI may contribute to the quick development of conditions that provide positive feedbacks. It may initiate the intra-industrial learning process that generates advantages compared to rival regions.

At the same time the uncertainty and thus the risks of TBI are also high. The direction of the intervention may prove to be false later; the performance of the enhanced industry may not reach the expected level. The rapidly established path-dependency decreases the chance for the reinforcement of other potential industries. And on the top the emergent relations endeavour to sustain the constant support of the dominant industry. These may cause larger problems than a missed early intervention. The risks of choosing a wrong path are much more larger in non-metropolitan and in less favoured regions, because they only have enough resources to create a very limited number of trajectories.

In the situation of *localized policy making* (path-dependent change) the potential role and scope of the economic development intervention is much more modest, they are restricted by the inertia of the well-established institutional system of the trajectory (Boschma 2005). The main focus of policy is the provision of the efficiency of the selection environment and the avoidance of the negative lock-in (Martin – Sunley 2006). *The potential effects of TBI are modest in this case*. However TBI has a role in fostering the constant emergence of start-up enterprises in the dominant industry (cluster), but as the technology is getting more and more mature, the heavier this task becomes – because of the far-gone learning process and the high costs of entering the market (Klepper – Simons 2005).

The most important consequence of placing TBI into the context of different worlds of industrial change is that policy makers cannot ignore the historically developed local institutional and relational systems. And these structures may hinder the development of new innovative industries, and thus hinder the potential effects of the TBI. This also infers that successful solutions of other regions (rooted in their given local context) can hardly be adapted. The "best practice" based policies have very serious limits (Boschma 2004). In this case less favoured regions often chase moving targets, where catching up is extremely difficult due the constant learning process and the self-reinforcing processes of a trajectory. The potential effects of economic policy (and TBI) are thus restricted, if it is not embedded into the historically developed local structures. This also infers that top-down, "one size fits all" solutions cannot be adequate.

Nevertheless the ideal "world" for a TBI intervention would be the situation of radical change (structural policy making). The matter however is that it very rarely (if ever) appears in its clear form, the historically developed structures are always present and always have the influence. The *concept of "niche"* allows us a more sophisticated analysis of the potential situations in which TBI is executed.

There exists a growing body of literature which recognises the role of niches (an analogy borrowed from ecology) in the emergence and early development (reinforcement) of new technologies (Schot – Geels 2007). Without these niches new technologies would be incapable of altering the existing structures and building up new ones for their own requirements. In connection with the emergence of nature-saving innovations Kemp (1998) argued that niches can be applied as elements of deliberate strategies (in the process of strategic niche management). The gist of this approach is the complex nurturing of potential new technologies: emphasis is put both on the direction of variations and the selection environment.

We must emphasize however that niche creation presumes a desirable direction (based on a local consensus). In case we focus on ecological objectives and use niche creation to foster nature-saving innovations, this direction is quite clear, and probably acceptable. But in most of the cases this direction is quite blur, which infers the high risks and uncertainty of the process.

It is not hard to recognize that *TBI fits well into the concept of niche creation*. TBI provides such temporary support and special (favourable) environment, which initiates the cumulative learning process in the emerging industry, fosters the intensification of the economies of localization. It also contributes to the development of the industry-specific environment, the channels of information-flow, and the mechanisms of lobbying.

The role of TBI as a niche is twofold. On the one hand it influences the emergence of new variations, on the other hand it shapes the selection environment. So TBI as a niche is a tool for targeted creation of new variations which is complemented with efficient selection[4]. The role of incubator is not solely to help the survival of randomly emerging start-ups by providing favourable environment. The emergence of variations, the direction of the search process can also be influenced.

Therefore the mechanisms of TBI's action consist of two – intertwining – elements: the shaping of the selection environment and the fostering of new variations' emergence[5]. The first one is essentially the provision of special environment where the chance of survival is favourable. This allows the routines of supported enterprises to spread in the local economy. The second one is ultimately the complex service provision that endeavours to provide the success of the innovation process.

Examining TBI from the angle of local industrial (and economic) evolution allowed us to recognize the niche-creating function of TBI and thus the two basic elements of value-addition. TBI endeavours to alter the present local structures and in doing so it is able to shape both the selection environment and the direction of new variations. These local structures have great inertia, so actually there is a necessity for such a complex approach. However this also infers the great uncertainty and risks of the intervention. The chosen direction may prove to be wrong later, but by that time generates a great inertia.

4. TBI: a „trial and error" process

The evolutionary approach puts strong emphasis on the decision making methods and on the structural change. Hence it allows us to analyze the economic policy decision making in the world of bounded rationality and constant change. It is essential to draw the consequences of bounded rational policy decisions to TBI, since the evolutionary and unpredictable nature

[4] The effectiveness of selection depends on the local socio-economic context. So the effectiveness can only be judged from the angle of the objectives (the effectiveness of selection is not an objective, timeless category, it can be effective for some purpose).

[5] This was the reason of putting forth such a definition of TBI in the introductory section.

of innovation process and industrial change infer that decisions are made under circumstances of great uncertainty.

Metcalfe (1994), Lambooy – Boschma (2001) and Witt (2003) put forth seminal studies on the economic policy consequences of evolutionary thinking. Witt emphasizes that decisions are based on a selective information base. The channels of problem perceiving, the selection of particular ones to be dealt with, and the tools believed to be appropriate reflect to the historically developed local system of relations, and the experience of the policy makers. These mechanisms rather reflect to the past than the present situation in the local economy.

Beside bounded rationality the other essential problem of economic policy intervention stems from temporality. Even a carefully executed analysis of the present situation provides us limited guidance on the future (unpredictable) changes. Economic actors adapt to policy interventions which alters the induced effects, and ultimately may influence the policy making. Thus economic policy making is a trial and error process where feedbacks and uncertainty are substantive elements (Witt 2003). These are actually the distinctive traits of the evolutionary economic policy (Hronszky 2005):

- uncertainty is not just a problem of recognition,
- the task is not solely to remedy the market failures of a static situation.

The evolutionary nature of the innovation processes and industrial change, the selective channels of perceiving development problems and the adaptation of the economic actors result in the *process of technology business incubation consisting of "trials and errors"* in the practice. A *successful programme design* must contain mechanisms that provide feedbacks from the induces effects, that select out the unsuccessful programme elements and that is able to meet the constantly changing needs of the supported enterprises (without hindering or distorting the emergence of the adequate market response[6]).

The program design is certainly just one element of the value adding capacity of business incubators. It is also shaped by many other factors, such as the traits and contributions of the supported firms (Rice 2002), the external relations of the incubators – especially with the academic sphere (Mian 1996, 1997); or the situation in the local economy analyzed in the previous section. However the heterogeneous value-adding capability of incubators (Barrow 2001, CEC 2002, Colombo – Delmastro 2002, Löfsten – Lindelöf 2002, 2005, Roper 1999, Tornatzky et al 2003) indicates that their ability to create the abovementioned mechanisms is very different.

The incubator programmes of restructuring countries are especially often criticized for their low value adding capability (Lalkaka – Abetti 1997). The Hungarian practice of incubation[7] also indicates that incubators fail to generate mechanisms that would be necessary to meet the challenges of the constant change and the bounded rationality. We argue that the following factors hinder Hungarian (and probably many other Central and Eastern European) incubators to do so:

1. The existence of the incubator depends more on the political will then on its ability to effectively support local start-ups.
2. The costs of service-provision are mainly covered by the donor. This infers that service provision has almost no risk at all, neither for the provider (the costs are covered), nor for the receiver (it is for free, or almost free).
3. In this situation the only way to develop new services is to obtain for more donor financing.

[6] The presence of private incubators in the "incubation industry" (especially venture capital and corporate venturing incubators) prove that in certain circumstances market is able to fulfil the basic incubator functions (Bajmocy et al 2006).

[7] For a detailed analysis see: Papanek – Pakucs (2005), Bajmócy (2006), Bajmócy et al (2006).

4. The management of the real estate and the service provision is the liability of the same person or organization (which is heavily dependent on the local political forces). This usually induces a special adaptation process: the reduction of the range of services[8], or the provision of standard services (and thus crowding out local firms).

This operating method can be called the *"substitute the market" approach of TBI*, since its characters are very similar to those described as "substitute the market enterprise development" (CDA 2001, Kállay 2002). Analogous to the other basic approach of enterprise development, we attempt to develop the "facilitate the market" approach of TBI, and we endeavour to do it from an evolutionary viewpoint.

The "facilitate the market" approach of TBI must be able to provide feedbacks from the induced effects, to select out the unsuccessful program elements and to adapt to the constantly changing needs of the supported enterprises. We argue that there are at least two preconditions to realize this:

- the division of the risks of service-provision, and
- the sustainability of the program where a significant proportion of the incomes derive from the service-provision.

In case the receiver pays for the service (at least partially) – after a short period of adaptation – they expect a value-adding at least in the extent of the price. If the sustainability of the incubator significantly depends on the service incomes, it needs to cease those services that face low demand. In this situation the supported enterprises get familiar with market-like transactions. It can be expected that they start to compare the incubator-services with the optionally present market solutions. Whether private knowledge-intensive business service (KIBS) providers offer more effective solutions, the supported enterprises will defect the incubator and make transactions with the local KIBS firms (be they even a little bit more expensive). Thus the incubator will be forced to cease the services that can be effectively provided by the market. So this mechanism provides a double selection: those services that are unsuccessful, and also those ones that are effectively provided by local KIBS firms. However if the proportion of service incomes are low in the overall income of the TBI programme, than these selection forces will be too weak. That is why it is sometimes not too fortunate to combine the tasks of service provision and property management.

[8] In this case TBI transforms into a publicly financed non-profit real-estate business.

Table 1: "Substitute the market" and "facilitate the market" approaches of TBI

	Substitute the market approach of TBI	**Facilitate the market approach of TBI**
Value-adding capability	Restricted value-adding capability	Possibility for significant value-adding
Sustainability	(1) By restricting the service provision to office lease. (2) By providing a range of standardised services (and thus crowding out local enterprises)	Sustainability of service-provision (with the constant ability to develop new services)
Feedback and selection mechanisms	Missing	(1) Division of the risks of service-provision (2) Relatively high proportion of incomes deriving from service provision
The role of local knowledge intensive service providers	The presence of local KIBS sector has no influence on the operation of the technology business incubator.	The active relations with the local KIBS sector are necessary for the technology business incubator to fulfil its functions.
The role of TBI with respect to the services required for the innovations of the firms of the fostered industry	TBI does not affect the quality neither the transaction cost of the services (however the costs are sometimes covered by the donor and not the firms)	TBI may have a significant role in facilitating the emergence of new services, increasing their quality, and in decreasing the transaction cost of service provision

Source: own construction

The distinction of the two models of TBI is actually the adaptation of the two basic approaches of enterprise development to business incubation from an evolutionary viewpoint. The basic differences are summarized in *Table 1*. The substitute the market approach fails to create the feedback and selection mechanisms that are inevitable when dealing with the evolutionary processes of innovation and industrial change.

5. Summary and Conclusions

The evolutionary-based analysis of technology business incubation revealed a dynamic and mutual relationship between the TBI process and the local economic and institutional environment. We argued that without examining these relations we can not understand the role, scope, potential effects or necessity of incubation. Our main findings can be outlined in the below theses:

(1) Technology business incubation *has significant scope of action in the period of an industry's evolution when path-dependency has not yet emerged*. In such a situation TBI, as a "small historical event", can play an important role in the establishment of the self-reinforcing processes of the industry. Owing to TBI's niche-creating function (able to affect both new variations and the selection environment) they are partially able to fulfil this task even when the historically developed dominant structures of the region (the presence of mature industries or clusters) hinder the emergence of new industries. But simultaneously *the uncertainty and risks of the intervention* are significant, especially in non-metropolitan and less-favoured regions.

(2) *The two components of the value-adding capacity of TBI* (fostering the innovation process by complex services and providing special environment) are originated from the dual ability explored in the previous thesis: fostering and steering of *new variations* and modifying the *selection environment*.

(3) The uncertainties of the processes of the learning-based economy, the selective channels of perceiving development problems and the adaptation of the economic actors result in the *process of technology business incubation consisting of "trials and errors"* in the practice. Within such circumstances of bounded rationality efficiency (impacts on the enterprises and on the local economy) can only be ensured if such mechanisms are established that provide feedbacks from the induced effects and select out solutions that had proved to be unsuccessful. The *"facilitate the market" approach of incubation*, which has been developed

in the study, provides a method to achieve this. Its main elements are the division of services provision's risks and the intensive role play by the local knowledge intensive business service (KIBS) sector.

We think that most of these consequences can easily be applied to other local economic development tools, like technology parks, cluster development, etc. which raises the need for an evolutionary underpinning of local economic development.

Acknowledgements

Recent paper is partially based on my PhD dissertation entitled „The Theory of Business Incubation and Opportunities of Application in the Less Favoured Regions of Hungary". All the useful comments that I received in connection with my PhD dissertation are greatly acknowledged. I am especially grateful to Imre Lengyel, Attila Varga and Gábor Papanek.

References

Acs, J. Z. – de la Mothe, J. – Paquet, G. (2000): Regional Innovation: In Search of an Enabling Strategy. In Ács, J. Z. (eds.): *Regional Innovation, Knowledge and Global Change*. Pinter, London – New York, pp. 37-49.

Arthur, W. B. (1989): Competing Technologies, Increasing Returns and Lock-in by Historical Events. *Economic Journal*, 99, pp. 116-131.

Arthur, W. B. (1990): Positive Feedbacks in the Economy. *Scientific American*, 262, 2, pp. 92-99.

Asheim, B. T. – Gertler, M. C. (2005): The Geography of Innovation: Regional Innovation Systems. In Fagerberg, J. – Mowery, D. C. – Nelson, R. R. (ed.): *The Oxford Handbook of Innovation*. Oxford University Press, Oxford – New York, pp. 291-317.

Bajmócy Z. (2006): *Opportunities of University Business Incubation in Less Favoured Regions of Transition Countries*. 46th Congress of European Regional Science Association, Volos, Greece.

Bajmócy Z. – Bajmócy P. – Major Á. (2006): Az üzleti inkubáció helyi gazdaságfejlesztési hatásai. *Területi Statisztika*, 5, pp. 494-508.

Bajmócy Z. – Kosztopulosz A. – Imreh Sz. (2007): Venture Capital and the Incubation of Small Enterprises. *Gazdálkodás*, 51, 19, pp. 74-83.

Barrow, C. (2001): *Incubators. A Realist's Guide to the World's New Business Accelerators*. John Wiley & Sons, New York.

Blakely, E. J. – Bradshaw, T. K. (2002): *Planning Local Economic Development. Theory and Practice*. Sage Publications, Thousand Oaks – London – New Delhi.

Boschma, R. A. (2004): Competitiveness of Regions from an Evolutionary Perspective. *Regional Studies*, 38, 9, pp. 1001-1014.

Boschma, R. A. (2005): Rethinking Regional Innovation Policy. In Fuchs, G. – Shapira, P. (ed.): *Rethinking Regional Innovation and Change. Path Dependency or Regional Breakthrough?* Springer, New York, pp. 249-272.

Boschma, R. A. – Knaap (1997): New Technology and Windows of Locational Opportunity: Indeterminacy, Creativity and Chance. In Reijnders, J. (eds.): *Economics and Evolution*. Edward Elgar, Chelthenham – Lyme, pp. 171-202.

Boschma, R. A. – Lambooy, J. G. (1999): Evolutionary Economics and Economic Geography. *Journal of Evolutionary Economics*, 9, pp. 411-429.

Boschma, R. A. – Wenting, R. (2004): The Spatial Evolution of the British Automobile Industry. *Papers in Evolutionary Economic Geography*, No.05.04.

Carayannis, E. G. – von Zedtwitz, M. (2005): Architecting GloCal (global-local) Real-Virtual Incubator Networks (G-RVINs) as Catalysts and Accelerators of Entrepreneurship in

Transitioning and Developing Economies: Lessons Learned and Best Practices from Current Development and Business Incubation Practices. *Technovation*, 25, 2, pp. 95-110.

CEC (2002): *Benchmarking of Business Incubators*. *Final Report*. Centre for Strategy & Evaluation Services. Commission of the European Communities, Brussels.

CDA (2001): *Business Development Services for Small Enterprises: Guiding Principles for Donor Intervention*. Committee of Donor Agencies for Small Enterprise Development. Washington.

Colombo, M. G. – Delmastro, M. (2002): How Effective are Technology Incubators? Evidence from Italy. *Research Policy*, 31, pp. 1103-1122.

Cooke, P. (2002): Knowledge Economies. Clusters, Learning and Cooperative Advantage. Routledge, London – New York.

Dosi, G. (1982): Technological Paradigms and Technological Trajectories: A Suggested Interpretation of the Determinants and Directions of Technical Change. *Research Policy*, 3, pp.147-162.

Etzkowitz, H. – Webster, A. – Gebhardt, C. – Terra, B. R. C (2000): The Future of the University, the University of the Future: Evolution of Ivory Tower to Entrepreneurial Paradigm. *Research Policy*, 2, pp. 313-330.

Goldstein, H. A. – Renault, C. S. (2004): Contributions of Universities to Regional Economic Development: A Quasi-Experimental Approach. *Regional Studies*, 38, 7, pp. 733-746.

Hackett, S. M. – Dilts, D. M. (2004a): A Real Options-Driven Theory of Business Incubation. *The Journal of Technology Transfer*, 29, 1, pp. 41-54

Hackett, S. M. – Dilts, D. M. (2004b): A Systematic Review of Business Incubation Research. *The Journal of Technology Transfer*, 29, 1, pp. 55-81.

Hronszky I. (2005): Az innovációpolitika megalapozása evolucionista megközelítéssel. In Buzás N. (szerk.): *Tudásmenedzsment és tudásalapú gazdaságfejlesztés*. SZTE Gazdaságtudományi Kar Közleményei, JATEPress, Szeged, pp. 13-33.

Kállay L. (2002): Paradigmaváltás a kisvállalkozás-fejlesztésben. *Közgazdasági Szemle*, 7-8, pp. 557-573.

Kemp, R. (1998): Regime Shifts to Sustainability Through Processes of Niche Formation: The Approach of Strategic Niche Management. *Technology Analysis & Strategic Management*, 10, 2, pp. 175-195.

Klepper, S. – Simons, K. L. (2005): Industry Shakeouts and Technological Change. *International Journal of Industrial Organization*, 23, pp. 23-43.

Lalkaka, R. – Abetti, P. A. (1999): Business Incubation and Enterprise Support Systems in Restructuring Countries. *Creativity and Innovation Management*, 8, 3, pp. 197-209.

Lambooy, J. G. – Boschma, R. A. (2001): Evolutionary Economics and Regional Policy. *Annals of Regional Science*, 35, pp. 113-131.

Lengyel I. (2003): *Verseny és területi fejlődés. Térségek versenyképessége Magyarországon*. JATEPress, Szeged.

Löfsten, H. – Lindelöf, P. (2002): Science Parks and the Growth of New Technology-based Firms – Academic-industry Links, Innovation and Markets. *Research Policy*, 31, 6, pp. 859-876.

Löfsten, H. – Lindelöf, P. (2005): R&D Networks and Product Innovation patterns. Academic and Non-academic New Technology-based Firms on Science Parks. *Technovation*, 25, 9, pp. 1025-1037.

Lundström, A. – Stevenson, L. (2005): *Entrepreneurship Policy: Theory and Practice*. Springer, New York.

Malecki, E. J. (1997): *Technology and Economic Development: The Dynamics of Local, Regional and National Competitiveness*. Longman, Edinburgh.

Malizia, E. E. – Feser, E. J. (1999): Understanding Local Economic Development. *Rutgers*, New Brunswick.

Martin, R. – Sunley P. (2006): Path dependence and regional economic evolution. *Journal of Economic Geography*, 6, pp.395-417.

Metcalfe, J. S. (1994): Evolutionary Economics and Technology Policy. *Economic Journal*, 104,
pp. 931-944.

Mian, S. A. (1996): Assessing Value-added Contributions of University Technology Business Incubators to Tenant Firms. *Research Policy*, 25, pp. 325-335.

Mian, S. A. (1997): Assessing and Managing the University Technology Business Incubator: An Integrative Framework. *Journal of Business Venturing*, 12, pp. 251-285.

Nelson, R. R. (1995): Recent Evolutionary Theorizing about Economic Change. *Journal of Economic Literature*, 33, 3, pp. 48-90.

Nelson, R. R – Winter, S. G. (1982): *An Evolutionary Theory of Economic Change*. Belknap Harvard, Cambridge, MA – London, UK.

Page, S. E. (2006): Path Dependence. *Quarterly Journal of Political Science*, 1, pp. 87-115.

Papanek G. – Pakucs J. (szerk.) (2005): *Nemzeti Technológiai Inkubátor és Magvető Tőke Program (National Technology Business Incubator and Seed Capital Strategy)*. MISZ – INNOSTART – VISZ, Budapest.

Rice, M. P. (2002): Co-production of Business Assistance in Business Incubators. An Exploratory Study. *Journal of Business Venturing*, 17, pp. 163-187.

Rice, M. P. – Matthews, J. B. (1995): Growing New Ventures, Creating New Jobs. Principles and Guidelines of Successful Business Incubation. Quorum Books, Westport – London.

Roper, S. (1999): Israel's Technology Incubator Programme. Repeatable Success or Costly Failure. *Regional Studies*, 33, 2, pp. 175-180.

Schot, J – Geels, F. W. (2007): Niches in Evolutionary Theories of Technical Change. *Journal of Evolutionary Economics*, 5, pp.605-622.

Sternberg, R. (2003): New Firms, Regional Development and the Cluster Approach – What Can Technology Policies Achieve? In Bröcker, J. – Dohse, D. – Soltweld, R. (ed.): *Innovation Clusters and Interregional Competition*. Springer, Heidelberg, pp. 347-371.

Stimson, R. J. – Stough, R. R. – Roberts, B. H. (2006): *Regional Economic Development. Analysis and Planning Strategy*. Second edition. Springer, Heidelberg.

Storper, M. (1997): *The Regional World. Territorial Development in a Global Economy*. The Guilford Press. New York – London.

Tornatzky, L. – Sherman, H. – Adkins, D. (2003): *Incubating Technology Business. A National Benchmarking Study*. National Business Incubation Association, Athens, Ohio.

UN/ECE (2001): *Best Practice in Business Incubation*. United Nations, Economic Commission for Europe, ECE/TRADE/265, Geneva.

Witt, U. (2003): Economic Policy Making in an Evolutionary Perspective. *Journal of Evolutionary Economics*, 13, pp. 77-94.