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**THE URBAN RESILIENCE
– ECONOMIC PERSPECTIVE**

Introduction

Cities now playing the role of engines for economic development, which offer opportunities for growth, but at the same time they also face with many internal and external problems (challenges) like: poverty, migrations, pollution, decay, natural disasters, economic crisis.

Thus, every city is affected by trends of transformation. These internal and external problems (challenges) also occur in transforming post-industrial areas, probably in the most extremely strong way. Some of them can adapt to such problems (challenges) while in others structural change leads to decline. Therefore the concept of urban resilience and urban economic resilience seems to offer an idea that makes it easier to understand and manage.

While there is an emerging research focus on sustainable cities, smart grow, green city, competitive city, creative city, attractive city, or ‘shrinking city’, there still remains poor scientific understanding of factors that make some cities (including those with industrial background) resistant to shocks (external and internal problems). Hence, the underlying question of the paper is:

- how the concept of the resilience can be understood in urban transition processes?

To answer this question, the following steps of investigation were implemented:

- first – to explore different meanings of the notions like: resilience, urban/ regional resilience, urban economic resilience,
- second – to show two basic research approaches for the urban economic resilience along with the model of urban economic resilience,
- third – to present selected studies on the urban/ regional resilience made so far.
- And finally, the general conclusions arising from the urban economic resilience concept were formulated.

1. Resilience, urban resilience, urban economic resilience

The idea of resilience to urban and regional studies has been introduced by the debate about sustainable development along with adaptation to climate changes (Simme, Martin, 2009). Urban resilience notion is also triggered by the major urban threats and disasters in the last few years, like the terrorist attacks in New York, the Asian tsunami and Hurricane Katrina in New Orleans, or bombing attack in London.

According to the Latin root, resilience is a “resilire” that means: to leap back or to rebound (Simme, Martin, 2009). Generally speaking notion of *resilience* is the ability of an entity or a system to recover from disturbance and disruption of some kind.

Of course, there is much ambiguity across the term of resilience, and there is no universally agreed definition of resilience in economics as well as in the regional and the urban studies. So, we have quite long list of definitions, like:

- reaction to specific extraordinary events and shocks (Simme, Martin, 2009);
- stability of a system against interference, but it is more than response to, it is a kind of systemic property (Welter-Enderlin, 2006);
- capacity to avoid and manage natural and human-induced hazards (Bosher, Coaffee, 2008);
- concept for understanding managing complex socio-ecological systems (Walker et al., 2006).

In turn, the notion of *urban resilience* can be perceived as a degree to which cities are able to tolerate disruption before re-organising around new set of structures and processes (Alberti et al., 2003). According to this, it means the urban resilience is not only “response to impact” (like disaster or economic decay) but also it is a society and economy that is flexible and able to adjust in the face of uncertainty. That lead us to the following definition of the urban resilience: the ability of a city to anticipate, prepare for, respond to and recover from a disturbance (Barnett, 2001; Foster, 2007).

Urban economic resilience is seen as the capacity to solve the local economic problems in a way that generates long-term success. Local and regional development is often a subject of disruptions like (Simme, Martin, 2009):

- periodic economic recession,
- rise of major competitors elsewhere,
- unexpected plants closure,
- technological change.

The way a local economy respond to these “events” shows in consequence how it develop and evolve. Finally, we can say the *urban economic resilience* is:

- the ability of a city’s economy to:
 - maintain a pre-existing to shock level of growth,
 - return to previous (i.e. pre-existing to shock) level of growth,
 - or completely change the economy structure and reach the previous level of growth at least – after experiencing external shock.

The level of local growth could be measures for example by level of: output, employment, population, migration.

In relation to *old industrial cities* the idea of resilience helps to understand (Simme, Martin, 2009):

- serious problems of adaptation arising from features of these kind of areas like (Lever, 1987):
 - release of large number of low qualified workforce,
 - factories closedown,
 - income polarization,
 - living conditions polarisation along with unequal access to public services,
 - de-urbanisation,
 - decrease of tax revenues,
 - ghettoisation,
 - lost of the socio-economic importance of a city in a country and abroad,
 - release of the post-industrial areas in a city's centre and its other districts.
- slow recovery of such areas, because of these features.

The urban economic resilience concept is also helpful in answering the question of when recovery may occur in the post-industrial cities. That is only in case the sufficient number of new developments coincide to provoke fundamental change in economic structure of such areas, or in the case they bounce back its pre-shock growth path by maintaining old patterns of production.

2. Urban economic resilience – research approaches

The urban economic resilience is unlikely to be invariant over time. It may depend on the nature of shock and changes over time as well as on specificity of city's socio-economic structure – which also evolves over time. That makes two basic approaches for study of the urban economic resilience. That are:

- the economic equilibrium approach (Simme, Martin, 2009; Hill et al., 2010),
- the evolutionary approach linked with adaptive cycle models from panarchy theory (Simme, Martin, 2009; Hill et al., 2010).

Equilibrist approach is more traditional, sometimes called “engineering resilience”. It is focused on the stability of a system near an equilibrium or steady state and returning to pre-existing equilibrium (Pimm, 1984). It is also explained as ability of a system (like a city) to absorb and accommodate perturbation without structure transformation or with collapse. That means that shock moves a city's economy off its equilibrium growth path but with the assumption of self-correcting forces, that bring it back onto the growth path again (like on Figure 1).

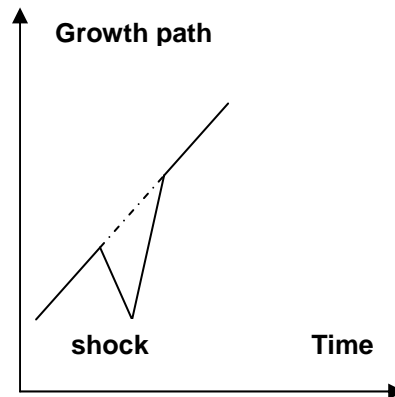


Figure 1. Response of an economy to a shock – equilibrium approach
Source: (Simme, Martin, 2009).

The problem with equilibrium approach is that, if the urban economy resilience is defined as ability to return to equilibrium after a shock, it is difficult to reconcile the notion with the idea of qualitative urban development and evolution (which assumes the fundamental change of structure and new equilibrium). Because – according to the equilibrium approach – the more resilient is the a city, the less it would change over time.

In evolutionary approach it is assumed that a city is the example of complex adaptive systems. It is living, dynamic, connected, and open system – evolving in many and varied ways to both internal interactions and the influence of external factors (Batty et al., 2004). Therefore resilient urban economy would be one capable of absorbing and accommodating extreme shocks without any significant change, or that one which is able to create in a quick way new socio-economic structures with success (Simme, Martin, 2009).

Therefore, there is no single equilibrium state or path but several possible states and growth paths, and a city's economy can be shifted from one such equilibrium to another by shocks. The resilient economy would be one that adapts successfully, resumes, or still improve its long run equilibrium path (Simme, Martin, 2009) – see the Figure 2.

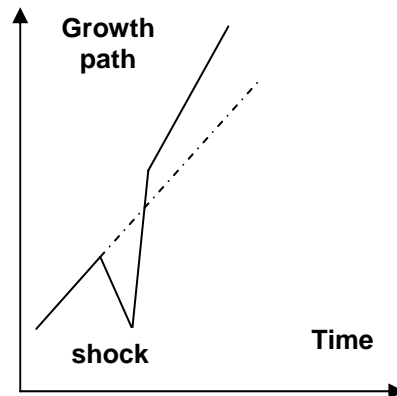


Figure 2. Positive response of an economy to a shock – evolutionary approach
Source: (Simme, Martin, 2009).

In contrast, a non-resilient city’s economy would be one that fails to transform itself successfully and instead becomes “lock-in” in frame of outmoded structure with lowering its growth-path (Simme, Martin, 2009) – see Figure 3.

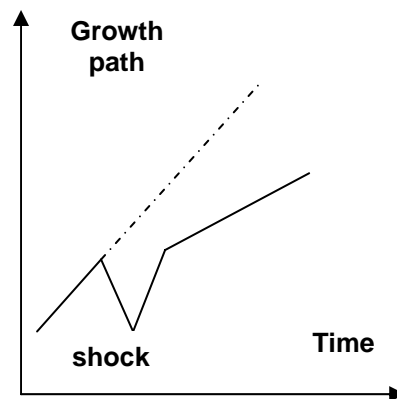


Figure 3. Negative response of an economy to a shock – evolutionary approach
Source: (Simme, Martin, 2009).

3. Urban economic resilience – 4 research perspectives

When we link the resilience concept with urban aspects and evolutionary approach, this opens up four possible research perspectives (Simme, Martin, 2009):

– *General Darwinism* – which emphasis variety and adaptability of a system (like a city). According to this, in urban dimensions:

- variety means structural or sectoral diversity of firms and their behaviour;

- adaptability means potential of local firms, institutions to adjust to changing circumstances in an appropriate way; for example by unfolding new behaviour patterns such as innovations.

Putting variety and adaptability together, it is expected that high level of variety and adaptability influences the urban economic resilience in a positive way.

- *Path Dependency Theory* – the standard path-dependency concept assumes the notion of “lock-in”. This is the process whereby an urban economy becomes “lock-in” in particular trajectory of economic development (David, 2005). Imparting the “shock” into the path-dependency concept makes two basic interpretations:
 - first: an urban economy is resilient if it is able to maintain its “lock-in”. Thus, it is a positive attribute of an urban economy; this is akin to the notion of “engineering resilience” (positive lock-in);
 - second: “lock-in” has a negative attribute as holding back the adaptation processes of urban economy; so, path-dependency undermines the urban economic resilience (negative lock-in).
- *Complexity Theory* – according to it – an urban economy represent complex adaptive system, characterised by several features, like for example (Martin, Sunlay, 2007):
 - degree of connectivity – referrers to functions and relationships that are distributed across the system elements;
 - boundary between a complex adaptive system and its environment; it is neither fixed nor easy to identify making its operational closure difficult (like an economy linkages in and out of a city);
 - self-organisation which imbues complex system with the potential to adapt its structure and dynamics to response to changes from external environment or internal shifts.
- *Adaptive cycle model from panarchy theory* – it links resilience with “adaptive cycle”. It posits a four phase process of continual adjustment in socio-economic and environmental systems. Each phase of the model is characterised by different levels of three dimensions (Simme, Martin, 2009):
 - the potential of accumulated resources to the system – like: competences of local firms, skills of local workforce, local institutional forms and arrangements, physical and soft infrastructure;
 - the internal connectedness of a system actors or elements – it relates to patterns of trade and untraded dependencies among local firms, local network of trust, knowledge spillover, formal and informal business associations, pattern of labour mobility;

- the resilience – perceived as measure of a system vulnerability to shock; high resilience is associated with phases of creative and flexible response – they would depend on innovative capacity of local firms, entrepreneurial capabilities and setting up of new firms, institutional innovation, access to investment capital, willingness of workers to improve educational attainments.

4. Urban economic resilience within the adaptive cycle model

The adaptive cycle model from panarchy theory applied to the urban economy includes two loops (Pendell et al., 2008):

- first: *exploitation to conservation* – this is the emergence, development and stabilisation of a city's economic structure and growth path,
- second: *release and reorganisation* – this is rigidification and decline of a city's economy structure and growth path, and opening up of the new potential types of activity and growth sources for exploitation.

The movement between these phases (see Figure 4) in an urban economy is the following (Pendell et al., 2008):

- *In the exploitation phase* urban growth develops, human and knowledge capital are accumulated, new local industries exploit comparative advantages. Resilience is high.
- *In the conservation stage* – as growth continues, the connectedness among elements of urban economy increases and the pattern of development becomes rigid. So the resilience to potential shocks decreases.
- *In release phase* – if shock appears, structural decline and loss of growth momentum are likely to follow. Firms close or move out of the city. The degree of connectedness decrease. The old patterns of production and the institutional forms unravel and resources are released. Resilience is low but may increase.
- *In reorganisation phase* – connectedness is low, the potential for creation of the new paths high. The trajectories of development are opened and thus, resilience is high. If – at this stage – the new activities as new technologies are introduced and started to exploit, new comparative advantages appear. And new round of the urban growth and accumulation is set in motion.

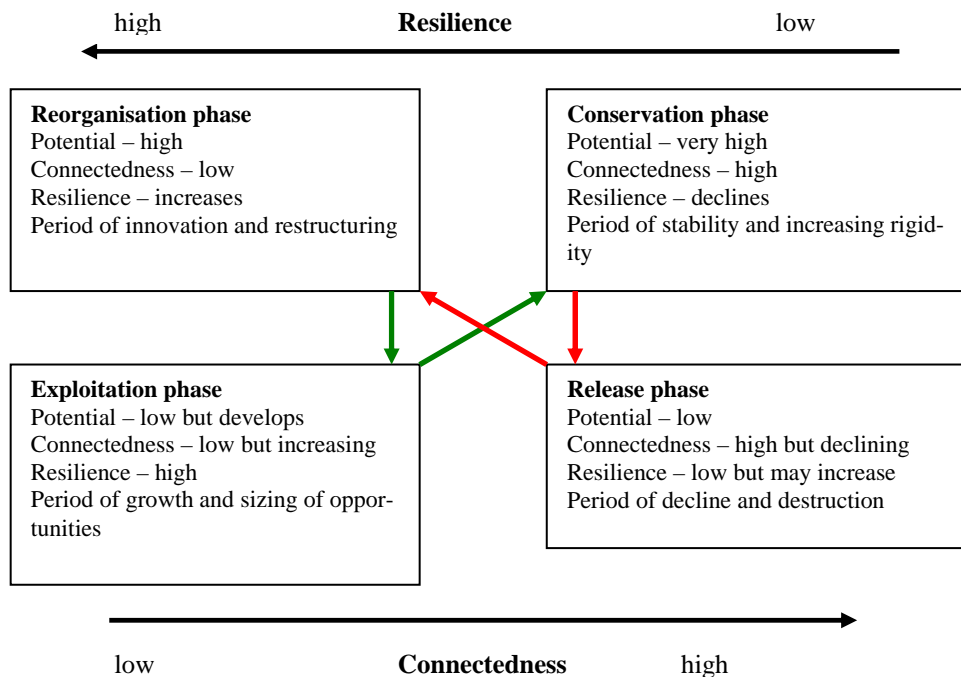


Figure 4. Adaptive cycle model and urban economic resilience
 Source: (Holling, Gunderson 2002); (Simme, Martin, 2009).

5. Economics shocks

Finally, there are few considerations about the economic shocks. Some urban economies are resilient to shocks while others suffer substantially downturns. So, partly according to the Hill research (Hill et al., 2010), cities may suffers from four kinds of shocks:

- *global economic shock* – caused by downturn in whole world economy – like financial crisis in last years;
- *national economic shock* – cause by downturn in the national economy;
- *sectoral industry shock* – cause by downturn in particular industries that are important part of a city’s export base, like for example the automobile industry;
- *other shocks* – cause by other external factors like natural disaster, movement of important firm or institution out of a city.

These shocks are not mutually exclusive. So, an urban economy may experience more than one simultaneously. Not all shocks throw a city’s economy off its prior growth path. That means (Hill et al., 2010):

- when shock do not cause a city’s economic downturn – we term a city: “*shock-resistant*” to that shock;
- when a city’s economy is adversely affected by the shock we considered it “*resilient*”, if it returns to its prior path growth or a new path growth with relatively short period of time; that means a city’s economy simply bounced back – because of favourable shift in the demand for its existing products, or because of upgrade of existing technologies, or because of produce of new products;
- if a city’s economy does not return to its previous growth path we called it “*not-resilient*”.

Please note, that a city prior growth path is not necessarily a good thing. For example, if the prior growth path was low or stagnant or environmentally harmful.

6. Research on urban and regional economic resilience

The examples of research on regional urban resilience were conducted mainly in the first decade of 2000. Among them there are research networks, scientific projects, as well as institutions aimed at examining the resilience concept in regional and urban context. For instance:

- Gleaser and Saiz (Gleaser, Saiz, 2004) run researches on importance of human capital in region’s resilience. According to them, human capital along with educational attainment and skills of the region’ workforce are the main drivers for growth and resilience.
- Building Resilience Regions is the example of research network establish in 2006 by MacArthur Foundation.
- Briguglio (Briguglio, 2006) – according to him, concentration of a nation’s exports in a few industries inhibit resilience. This suggests similar hypothesis of regional and local export industries.
- Stockholm Resilience Centre, established in 2007, is organised into research themes that address different issues of resilience and transformation – not only on a regional or an urban scale – like:
 - freshwater, food, and ecosystem services,
 - global and cross-scale dynamics,
 - governance of coastal and marine systems,
 - adaptive governance, networks and learning,
 - regime shifts,
 - urban social-ecological systems,
 - Baltic sea ecosystem management.

- Resilience Alliance Initiative for Transitioning Urban Systems Towards Sustainable Future was established in 2007 and it is organised by: CSIRO* Canberra, Arizona State University, Stockholm University. The Alliance was established to generate scientific bases to formulate positive strategies for urban future in the context of urban resilience. The urban resilience is defined by four elements (see Figure 5):
 - *Metabolic flows* – focusing on interactions: production, supply and consumption chains. For example, production systems that rely on one type of fuel – as their energy source – can be highly vulnerable if the particular fuel is in shortage. So diversifying fuel sources moves the system (a city) to higher resilience.
 - *Social dynamics* – focusing on demographic changes (excessive growth or shrinking cities problems), human capital changes (like educational attainments) and inequality (like social stratification in housing leading to problems of extreme disadvantages in living conditions).
 - *Governance networks* – focusing on changes in institutional structures like shift of power, decentralisation of public services, privatisation, emergence of institutions that are able to produce, capture and share knowledge (Thilo Lang, 2010).
 - *Build environment* – focused on urban landscape, a spatial organisation of a city and thus its infrastructure, physical locations of roads, railways, airports, green areas. All these features of urban landscape may have significant influence on the flow of commerce and people in and out of a city.

* Commonwealth Scientific and Industrial Research Organisation.

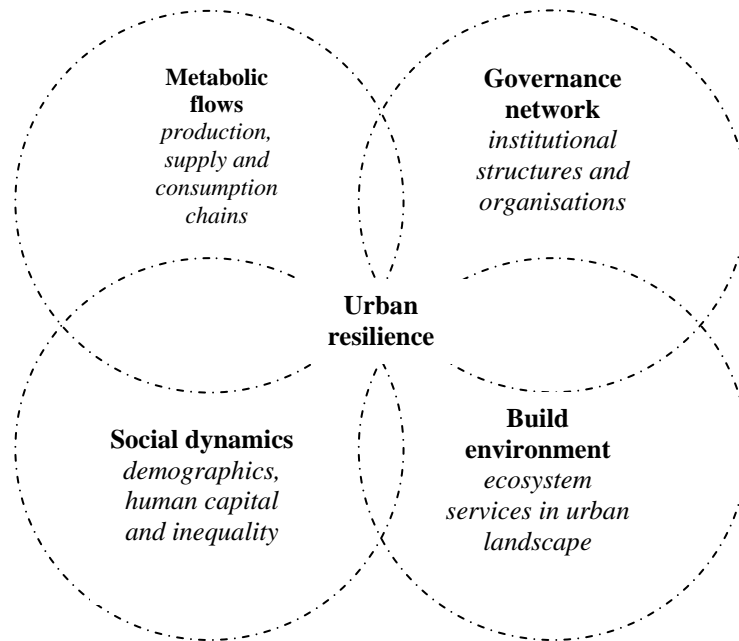


Figure 5. Four interconnected research themes within the Resilience Alliance Initiative
Source: Resilience Alliance Initiative for Transitioning Urban Systems Towards Sustainable Future (2007).

- Duval, Elmeskov, Vogel (Duval, Elmeskov, Vogel, 2007) – according to them, the public policies that restrict firms’ ability to lay off or reassign workers make shocks less severe but also make them last longer;
- Feyrer, Sacerdote and Stern (Feyrer, Sacerdote, Stern, 2007) run research on counties that experienced auto and steel industry job losses in late 1970s and early 1980s in the U.S. According to them, employment and population of counties after a shock failed to grow during nearly two decades after shock;
- Christopherson and Clark (Christopherson, Clark, 2007) – according to them, the growth and regional resilience may be inhibited by domination of: regional labour markets, suppliers, R&D units, informal business association by a few large vertically integrated firms;
- Desmet and Rossi-Hansberg (Desmet, Rossi-Hansberg, 2009) also run the researches on the regional resilience and according to them regional economies can be renewed if their firms can introduce new goods or services for export in a quick way or use new technologies to produce such goods and services;
- Gerst (Gerst, 2009) explores the different paths of development in IT centres localised in urban areas in the US (after the IT bust in 2000). The research revealed that: impact of decline and path of recovery varied considerably,

showing differences in urban economic resilience. IT centres specialised in IT services performed better than those in manufacturing because of their highly educated labour force.

Studies of Hill (Hill et al., 2010) are relatively important for urban policy formulation. He runs researches on urban economic resilience in metropolitan areas of the U.S. According to him, cities that experienced employment shocks, recover to their pre-shock employment rate but not to their pre-shock employment levels within eight or fewer years. The reason is that: workers in the U.S. quickly leave cities that have experienced large job loss – while the lack of emigration of jobseekers help a city’s employment rate to recover. Moreover employers do not relocate jobs to cities that have experienced large employment shocks (Blanchard and Katz, 1992).

Hill also noticed that durable goods manufacturing makes the metropolitan areas more susceptible to economic downturns. Cyclical demand for durable goods makes employment in that sector susceptible to downturns. It could be resilient in case of eventual rise of demand. On contrary, cities with dominance of health care sector and public administration sectors are more shock-resistant.

Additionally cities with large share of population with low levels of education are more susceptible to downturn. If after a shock, pre-shock demand for low qualified workforce return they are resilient. But if not, they are not-resilient.

Cities with lower levels of income inequality (measured as gap between high- and low-income households) are less susceptible to downturns (shock-resistant). And finally the presence of large number of research universities appears to enable a city’s economy to recover more quickly (resilient). But there is one condition: the research universities and R&D units must lead projects with high level of commercialisation and spin-offs.

Conclusions

The urban resilience concept formulates relatively new question in local development studies: how a city should develop to successfully cope with external and internal changes. In evolutionary approach the urban economic resilience is perceived as ongoing process rather than a recovery to steady state or equilibrium. Cities as complex adaptive systems is being self-organised with few critical processes creating and maintaining these self-organisation. Such systems combine social, economical and environmental elements which are “interlinked” in never-ending – but changing considerably among cities – adaptive cycles of growth. Thus, the urban economic resilience concept:

- seems to be the useful attempt for explaining processes of a city transformation in complex way under the conditions of changeability of external factors influencing an urban economy;
- allows for and justify the selection and application of other urban economic development concepts (like creative city, smart growth, competitive city, etc.), which under the specific internal and external conditions as well as on different stage of a city's transformation may substantially determine an urban growth. And thus, make a city "resilient" or "shock resistant";
- shows the reason to prompt public policy response, so it allows to adapt governance and institutional approach into the urban development processes;
- can be perceived as an effective frame for an urban policy formulation both at different levels of a self-government and for different cities' types – referring to their stage of transformation and development. Therefore, it may be used as theoretical background for strategies, programmes, and projects aimed at creation of "resilient" or "shock-resistant" city in turbulent environment;
- is particularly useful for the post-industrial cities coping with large number of socio-economical and environmental problems of transformation and experiencing external shocks more severely than other urban areas at the same time.

Urban economic resilience identifies the points at which a city is capable of accepting positive change as well as points it is vulnerable. The high resilient city opens gates for novel combination of resources and trigger innovation. In contrary – improvement of a low level of city's economic resilience – like in the case of post-industrial cities – requires:

- recombination of a city's economy elements,
- and need for recombination and innovation to occur simultaneously to open a window for creating fundamental change.

The important factor in building cities' economic resilience for long-run success is *the ability of flexibility*. This should base on knowledge how to adapt industry, technology, labour force, institutional structures to changing competitiveness, technological, and market pressure as well as to capitalise opportunities in quick way.

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