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The application of resilience concept in the regional development context

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Abstract

Economies have always been prone to different kinds of shocks: economic downturn, industry shocks, currency crises, which can destabilize the path and pattern of regional economic growth. Regional economies are suffered from this disturbance, which consequences could be continued for a long time. The question why one region is more vulnerable to economic shock than other, impelled to analyze resilience notion in regional development context. Often used in engineering and ecological sciences, the notion of resilience is rapidly becoming part of the conceptual and analytical lexicon of regional economic studies. There is no universally agreed definition of regional resilience, as well as there is yet no theory of regional resilience as such. In this paper the multidimensional aspects of regional resilience notion will be revealed as well as proved the resilience is a dynamic feature insured regional uninterrupted development or fast enough recovery after economic shock occurred. The main purpose of the paper is to identify the specific aspects of resilience notion used in the regional development context. Based on systematic and comparative analysis of scientific literature comprehensive analysis of regional resilience is performed; regional resilience process and outcome framework is developed, structural dimensions of regional resilience is identified; regional resilience capacity building factors are presented.

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Keywords: Regional resilience; Vulnerability; Inherent and adaptive capacities, Dynamic capabilities, Growth path.

Introduction

Over the past 10 years the notion of resilience could be often obtained in academic, political and public discourse. In nowadays scientific literature are lots of attempts trying to analyze the notion of resilience in various

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context. In recent years, ongoing changes, influenced by global economic crisis, affected all components of the regional economy. Emerging countries' economies are faced with a challenge – be resistant regional economy to economic fluctuations or not, because the changes are dramatic and complex in term of crisis length and its outcomes to all country economy.

After 2007-2009 years' economic crisis the notion of resilience was rapidly becoming part of the conceptual and analytical object of regional economic studies. Even more, transferred from ecological and psychological sciences, the notion of resilience was invoked in diverse contexts, as perceived or positive property of the system, and as a desired feature that should be stimulated and fostered. Regional resilience research area broadly investigated in foreign scientists' research works (Hill at al., 2008; Rose, 2009; Norris et al., 2008; Cutter et al., 2008; Martin, 2012; Foster, 2006; Timmerman, 1981; etc.). There regional resilience is determined how the region or system responds to shock or disturbance and under these circumstances able to ensure its continuous development.

However today there is no universally agreed notion of resilience in the context of regional development as well as there is no one generally accepted methodology for how regional resilience should be measured, i.e. there are no concrete and clearly defined factors for regional resilience capacity building. *The main purpose of the paper* is to identify the specific aspects of resilience notion used in the regional development context. The article discusses theoretical background for regional resilience and provides the regional resilience capacity building factors.

1. Comprehensive analysis of regional resilience

Historically, the first definition of resilience notion is found in Encyclopedia Britannica (1824), where resilience is defined as “1: the capability of a strained body to recover its size and shape after deformation caused especially by compressive stress” or “2: an ability to recover from or adjust easily to misfortune or change”. Resilience has roots in the Latin word *resilio/resilire*, meaning “to jump back” (Klein, Nicholls, and Thomalla 2003). The notion of resilience is broadly defines as “a return to an original state”. Because of resilience notion's multidimensional aspects, it is adopted to different scientific disciplines, including physics, risk management, social sciences.

Table 1. Interpretations of resilience notion based on systemic approach

Authors	Definition
Coles, 2004	A community's capacities, skills, and knowledge that allow it to participate fully in recovery from disasters.
Walker, 2004	Capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks.
UNISDR, 2005	The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure.
Cutter et al., 2008	Resilience is the ability of a social system to respond and recover from disasters and includes those inherent conditions that allow the system to absorb impacts and cope with an event, as well as post-event, adaptive processes that facilitate the ability of the social system to reorganize, change, and learn in response to a threat.
Norris et al., 2008	Process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance.
Rose , 2009	Process by which a community develops and efficiently implements its capacity to absorb an initial shock through mitigation and to respond and adapt afterward so as to maintain function and hasten recovery, as well as to be in a better position to reduce losses from future disasters.
Hill et al., 2008	The ability of a regional economy to maintain a pre-existing state in the presence of some type of exogenous shock; the extent to which a regional or national economy that has experienced an external shock is able to return to its previous level and/or growth rate of output, employment or population.
Martin, 2012	The capacity of a regional economy to reconfigure, that is adapt, its structure (firms, industries, technologies and institutions) so as to maintain an acceptable growth path in output, employment and wealth over time.
Foster, 2006	The ability of a region to prevent, prepare, respond and 'recover' after a disturbance so as not to stand this obstacle to its development.

In order to perform comprehensive analysis of regional resilience concept, firstly, a region as a research object in regional resilience context could be clarified. Most often the region is perceived as a territorial unit, a part of the state or the world, characterized by the certain specific natural, demographic, social and economic conditions, defied

by and distinguished it from the adjacent regions (Kėdaitis, Vaškeviūtė, 2007; Bagdzevicienė, Dapkus, 2005). In economic terms, the region is conceptualized as a unit of social-economic space, characterized by production structure of all ownership forms, population, employment concentration as well as governmental institutions. Fundamentally, the region is a social, cultural, political and economic interaction system (Agnew, 2000, 2001; Haukkala et al., 1999).

Nowadays new and non-traditional approaches to economic systems are emerged. One of this is complexity economics, which rejects the assumptions of the economy as closed, tending to gain balance, system. Nicolis G., Nicolis C. (2007), Erdi (2008) complex adaptive system defined as open and endogenous evolution system, which components linked to strong relationships and networks, as well as main characteristics are self-regulation and dynamism, which changes depend on regulatory parameters (Kelso, 1999). The origin of such regulatory parameters could be various: environment (Diedrich, Warren, 1995; Stergiou et al., 2001), internal process (Pellecelia, Turvey, 2001) and interactions inside the system (McGarry et al., 2002).

Analyzing the region as a system, interpretations of resilience notion based on systemic approach presented in Table 1. Region as a system is comprised of smaller systems and a part of large system, a focus exclusively points on different kind of interactions within and between the systems. The resilience defined as the ability of the system to anticipate, resist, absorb, respond to, adapt to, and recover from a disturbance. When resilience concept is analyzed in regional development context, a region growth path is that “standard indicator” being used for resilience to shock evaluation. Therefore, suggested more expansive definition of regional resilience as the capacity of a region to withstand and recover from external pressure or shock in order to maintain region’s growth path close to potential or if it is necessary to reorganize its structure and transit to the new growth path.

2. Regional resilience process and outcome framework

Three perspectives are existed to obtain regional resilience. Tierney, Bruneau (2007) developed resilience as an outcome, Norris et al. (2008) presented resilience as a process, Cutter et al. (2008) represented resilience as both as process and outcome. Based on systems perspective, regional resilience is conceived both as a process linking a set of adaptive capacities (social, economic, infrastructure capital, etc.) to overcome shock and outcome when region accepted undergoing adaptive changes to its economic structure by transiting into new sustainable growth path.

The regional system economy suffered by the economic shock and depending on current regional development capitals the region economy is resistant, that means the region economy is adapted to existing situation after the shock. If the region economy is less resistant and more vulnerable, it suffered interim disturbance. Depending on the extent of vulnerability, the region economy could suffered constant disturbance, or tried to adjust to changed situation by using dynamic capacities in order to recover, renewal or re-orientated after the shock.

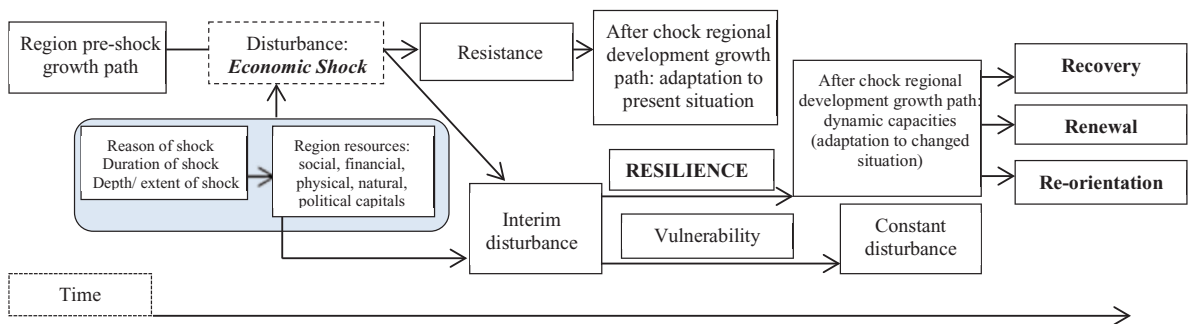


Fig. 1. Regional resilience process and outcome framework
 Source: performed by authors (based on Martin, 2012)

Anyway, resilience comprises at least two dimensions: the extent to which shocks are dampened, in other words, the amount by which the region’s economy declines and the speed with which region economy revert to normal growth path following the shock, in other words, the amount of time required to return to the pre-shock growth path.

Based on Martin (2012), regional economic resilience is a multi-dimensional property involving four interrelated dimensions, which fully and precisely describe regional economic resilience's respond to shock: resistance, recovery, re-orientation and renewal. *Resistance* - the property indicates the initial impact of the shock; other words resistance measures the depth of reaction of regional economy to shock. *Recovery* – the property indicates the speed of bounce back and determined by the degree of resistance to the shock at the first moment, other words the nature of the path to which the region recovers. *Re-orientation* – the property indicates the extent to which region adapts it's economic structure or re-orientated, which implications are positively influenced its economy. *Renewal* – the property indicates the degree resumption of the region economy's growth path before the shock occurred.

Besides four mentioned regional resilience properties, four more elements are very important: *Robustness* – the ability of a system to preserve its structure in the face of disturbance (Tu, 1994) or the strength elements of the system in order to withstand external pressure without suffering any loss (Bruneau et al., 2003). *Redundancy* - the ability of the system to respond to disturbance by overcoming dependence by deferring, using substitutes or even relocating (Van der Veen et al., 2005). *Resourcefulness* - the capacity to mobilize and apply material and human resources to achieve goals in the events of disruptions (Bruneau et al., 2003). The local availability of resources and skills may be directly relevant to emergency management, planning, preparedness in disruptive situation (Buckle et al., 2000). *Rapidity* - the property measured “speed of return to pre-existing state”.

Additionally, robustness, redundancy, resourcefulness and rapidity, sometimes called main dimensions of resilience, named 4R approach provides guidance for achieving acceptable level of loss system performance. Furthermore, R4 approach highlights the multiple paths to resilience and directs to look beyond physical and organizational systems to the impact of the chock on social and economic systems.

3. Shaping regional resilience

Two types of structural factors shaping regional resilience are defined (Rose, 2004; Cutter et al., 2008; Coles, 2004; Malaker, et. al., 2004; Norris et al., 2008; Hill et al., 2008; Martin, 2012): 1. *Inherent capabilities* (region's economic structure, innovation system, skills base, competitiveness level prior shock); 2. *Adaptive capabilities* (the mix of actions and decisions are needful for accelerating regional resumption). Based on Rose (2004) the mix of inherent and adaptive capabilities and their interaction within the region could ensure this region's resilience to the shock. Davies et al. (2010) remarked that region's inherent factors regional resilience depends on hidden in regional economy strengths and weaknesses. Such factors as physical and human capital, competitiveness, innovation system, entrepreneurial culture, endowments in natural resources and physical capital, etc., play a significant role shaping regional resilience. Obviously, the region with relatively poor economic performance is more suffer from the shock in comparison with stable economic performance region. Important aspect is that based on complex adaptive system perspective, inherent systems' capabilities leads to self-organize. Bristow (2010), Levin et al. (1998) and Davies et al. (2010) indicated more inherent dimensions closely correlated with region's vulnerability to shock – *sectorial structure* or *degree of regional specialization*, and *diversity*. Both of these aspects are essential in complex adaptive systems in terms of absorbing shock and re-organizing the system following the shock.

Based on scientific literature, there are lot of factors affect region abilities to be resilient. Each factor is different in each region and changes over time. Christopherson et al. (2010) argued that the success of each region can be largely measured by the past and current economic growth, evaluation additionally adaptation to changes, convergence, and sustainability. Region, as a system of political and economic processes, human actions and social relations, can analyzed as constant process of transition through time and space. This statement pointed that each region should consider its strengths, build economic development strategies, identify its own assets and strengthen socio-spatial relations among the social agents of capital, labour, state and politics.

Main factors marked the region to be resilient are *strong innovation system; learning region; experienced, skilled, innovative and entrepreneurial workforce; a diversified economic base; a modern production base which has modern infrastructure; high degree of regional specialization; existence of supportive financial system to provide funds; the existence of competitiveness; the existence of a supportive system of governance with science, innovations and industry*. (Bristow, 2010; 2010; Clark et al., 2010; Howells, 1999; Archibugi & Lundvall, 2001).

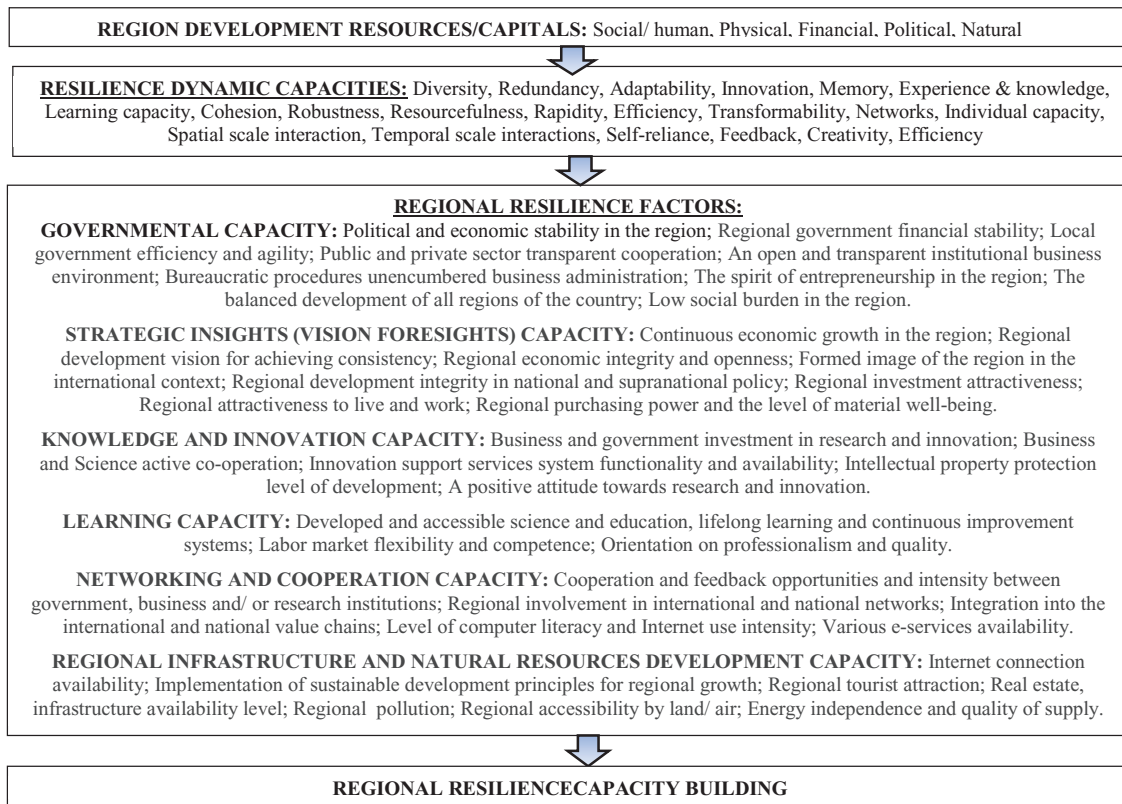


Fig. 2. Regional resilience capacity building

Source: performed by authors (based on Jucevicius, Juceviciene 2014, Jucevičius, Liugailaitė-Radzvickienė 2014, Schaffers et al 2012, Porter et al 2011, Cutter et al 2010, Chen & Dahlman 2005)

Important to understand that it is not enough just to have the factors mentioned above in one region to ensure its regional resilience, but appropriate processes, structures and conditions should be applied as well as timely implementation of policies should be performed.

Conclusions

Regional economic resilience is a recurrent process, when regional resilience both shapes and shaped by the region's economy reaction to shock. Resilience in regional development context is defined as the capacity of a region to withstand and recover from shock in order to maintain region's growth path close to potential or if it is necessary to reorganize its structure and transit to the new growth path. Whereas the region is a system that consists of many different components, combined in various forms relationships, regional resilience is identified as the capacity of all components' in the sum to withstand and recover from the shock.

Regional resilience comprises two dimensions: the extent to which the regions' economy declines and the speed or time required to return to the pre-shock growth path. Regional resilience is dynamic feature composed of at least four interrelated dimensions robustness, redundancy, resourcefulness, rapidity. The structural dimensions of regional resilience are inherent and adaptive capabilities. Regional development capacity building structure concludes, that the region which is able to use consider its strengths, build economic development strategies, identify its own assets and strengthen socio-economic spatial relations among all the agents in the system, successfully adopting resilience dynamic capacities, itself could shape and ensure its resilience by governmental, knowledge and innovation, learning, networking and cooperation, regional infrastructure and natural resources development capacities building.

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