Resilience or Flexibility– A Theoretical Approach on Romanian Development Regions

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The paper describes a theoretical contextualization of flexibility, sustainability, durability and resilience, in the context of the sustainable development goals. The main purpose is to identify the theoretical handles that may be used in the creation of a flexibility indicator. Thus, research questions related to the theoretical differentiation between durable and sustainable, flexible and resilient are answered. Further on, the paper describes the situation of the Romanian regions in terms of development indicators, based on Eurostat data, as a premise for further research on the possibility of their leapfrogging.
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Introduction

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Theoreticians and practitioners alike concern for the future of modern civilization, such as it is understood today, and this is obvious in the literature and active measures proposed by policy makers. The dilemma of incompatibility between the current development model and natural resources availability, coupled with increasing economic disparities between regions, social classes, countries or regions rather reflects a convergence-free future. In September 2015 at the Summit of the United Nations, a number of 17 SDGs (Sustainable Development Goals) are proposed towards adoption and aimed to be fulfilled by 2030, as a global assurance of the commitment towards an optimal future existence. Five of these 17 goals are strictly related to global competitiveness, and thus to economic concerns. Such a synergistic effort is more than necessary to focus innovation, creativity and funding towards translating global aspirations locally in action-oriented moves by countries, regions and cities that are more than ever required to be flexible.

A theoretical framework – literature review

There is a wide overlap between two concepts: durable and sustainable, often used as equivalent. There are, however, many major differentiating elements, namely (Dinga, 2011):

Durability is attributed to a system in equilibrium or that tends to be in equilibrium, while sustainable systems tend to shy away from that particular state

Durable systems, unlike the sustainable ones, do not have what is known as a cultural subject (praxiological objects, cognitive subjects and praxiological subjects)

Durability does not involve dissipative systems, while the sustainable economic process may be considered a logically-alive system (an eco-system), whose sufficiency predicate is dissipativity

Durability refers to stationary systems, which, without uncertainty, generate the same results if presented with the same input: sustainability may have a developmental direction

Supplementary, sustainable systems have a low degree of predictability, while durable systems, through their stationarity, are a priori predictable. We can talk about predictability, from the highest possible degree (stationarity), which is equivalent to the absolute invariance of results, to stability, characterized by relative invariance (not fixed to a single point, but around it - within an expected interval) and to sustainability, with a tunnel variance with direction, not just a range or a two-dimensional interval.

In this paper, we will adhere to the definition of Dinga (2011) on sustainability as meeting the needs of system analysis rather than the general definition of Brundtland Commission (1987), respectively *"the characteristic of a process (phenomenon, system) to be maintained through inputs (normative state variables) on a desirable trajectory in a predetermined "strip" or acceptable range for an indefinite time and on a global space of accessibility."* The general definition is limited to environmental sustainability, strongly anchored in practical issues, while this definition presents ideas that are translatable to any dissipative system.

Consequently, considering these elements, we may adjust Hinterberger's statement (1994), stating that for the evolutionary systems, stability and flexibility are crucial, noting that sustainability and flexibility are elements / features essential to an evolving system. Flexibility can be defined (Mandelbaum, 1978) as "the propensity of an actor or a system to provide variations in activities or conditions that correlate with another variation and are desirable in terms of the latter." The propensity can be related to the variation (variation tends to occur), it is necessary to be distinguished from the variation in itself, the distinction being the result of the potentiality of the result. Flexibility is, therefore, by definition, desirable, variability is not desired and therefore can not be called flexibility. Thus flexibility (desired variability) is symmetrical

with stability (desired relative invariance) (Jonsson, 2007). What is not considered in definition of Mandelbaum is the subject of desire or actor for variability, because we can not conclude that flexibility is sought with equal intensity unanimously by all the actors of the system.

Flexibility towards Sustainability will be, starting from these assumptions, a system tendency to vary in a tunnel on a desirable trajectory in an indefinite time horizon and overall accessibility. Golden and Powell (2000) consider that flexibility can be a definition of resilience on four dimensions: time, space, intention and direction. This definition is consistent with the above, the intent and direction of the path being described by the desirable trajectory, the indefinite time horizon and global availability space.

The instruments used for measuring flexibility are, in the opinion of Golden and Powell (2000): versatility, robustness, efficiency and responsiveness. It therefore found again a consistency with sustainability, which is not related to optimality, but efficiency. Furthermore, a self-reproducing system is sustainable if the mechanism of transmission of the shock, which can be called grammar of the process, can be characterized by responsiveness (transmission speed, spontaneity feedback). If we define robustness as the ability of an economic model to remain valid under various assumptions, parameters and initial conditions, ie to keep a minimal set of invariants, which relates to sustainability and the self-reproducible and repeatable systems. Finally, versatility can be linked to the correlation between sustainability and vulnerabilities, namely the capacity of a flexible and sustainable system to break down systemic vulnerabilities. Consequently, we can say that flexibility is the propensity, the potential ability of a system to be sustainable, while sustainability is putting it in fact. Two theorems may be proposed to this effect:

Theorem 1: A flexible system is sustainable. Because flexibility is defined as likelihood, this shows a probability of achievement, variability, not a variance. Thus, we can say that there are flexible systems that are not

sustainable, they are theoretically flexible, but in fact observable behaving rigid, invariant. There is in this case a wasted potentiality. Theorem is proved.

Theorem 2: A flexible system is sustainable. A sustainable system will be manifested by variance in a predetermined bandwidth, so flexibility will achieve its potentiality. Theorem is proved.

Flexibility is conceptually connected to sustainability, as previously explained. If one can state that the economic system has the potentiality to become sustainable, then any economic system can flex, respectively, can create conditions to reflect and show variability. Further, one can detect sufficiency and necessity predicates for what is known as a regional entrepreneurial ecosystem (using the generic name - see Isenberg (2009). A regional entrepreneurial ecosystem will be:

a network (logically-alive system (dissipative system, nonlinear, autopoietic, invariant in its total complexity) characterized by indiscernibles, universal accessibility of information, and spontaneity feedback) - this predicate contains the emergence process of the network (nondeliberative, non-computational and non-structural)

a sustainable economic system.

The membrane system is defined arbitrarily by the geospatial definition of the region, according to generally accepted conventions (In the case of this analysis, NUTS 2 to enable data availability.)

Finally we should mention the concept of resilience, as it can also be found in the literature on regional development (Simm and Martin, 2011), although there is no universally accepted definition of it. One possible definition is proposed by Foster (2007) who considers regional resilience as the ability of a region to anticipate, to prepare for, to respond to, and to recover from a disturbance. Therefore, there is a transmission mechanism and a maintainance of the trajectory after manifestation of a shock, which is equivalent to sustainability as previously defined. Initially, regional resilience has been defined in terms of equilibrium, the capacity of the regional system of maintaining

this steady state, which would mean an elastic system (Holling, 1973; Pimm, 1984; McGlade et al., 2006), no variation thereof within a "steady", which equates to stability. This, however, is inconsistent with the need for growth in a region in the light of the foregoing definitions of stability, thus leading to a refinement of the concept of resilience as the magnitude of the shock that can be absorbed into the system before changing the structure and the way it relates to other processes. (Holling, 1973; McGlade et al., 2006). Holling and Gunderson (2002) and Pendall et al. (2008) propose a model in four phases of the cycle of adaptation, consistent with the definition of sustainability, which brings together the variations in three areas, namely: accumulated potential resources available to the system (generating endogenous energy for the system), interconnecting actors at system level (flows) and toughness, that measures systemic disruption and shock vulnerability (correlated to the link between sustainability and vulnerability), noting that a high degree of resilience is associated with creative and flexible phases.

As a last consideration on flexibility and sustainability, we must refer to the concept of *leap-frogging* (jump), originally derived from the Shumpeterian creative destruction, and currently used to denote a theory of development that involves burning phases, leap over technologies less effective in terms of costs or impact on the natural environment (Goldemberg, 1998). Such systems that are in early stages of development can take best practices and switch to advanced stages without costs associated with catching up. Extensive research on leap-frogging and especially to regional leap-frogging were conducted by the Israeli Reut Institute, in an approach to identifying regional policies that could be implemented to allow sustainable growth, achievement of the Israel 15 visionand the jump of the geographical periphery, respectively centripetal forces mitigation under the new economic geography. It is even more relevant example as Israel is one of the few countries that managed to potentiate the backdrop of financing innovation via venture capital. The jumps have limitations, a World Bank study (2008) noting

the need for an average infrastructure that allows the implementation of high-end technology solutions, which would translate, for example, to the Romanian regions in the need for electricity in all households region before widely disseminating broadband. The jump may be emerging (what corresponds to the suffciency predicate of the regional entrepreneurial ecosystem) or the result of a decision-making approach, in conjunction with a common vision and a proper leadership.

Research findings: A Romanian position amongst European regions

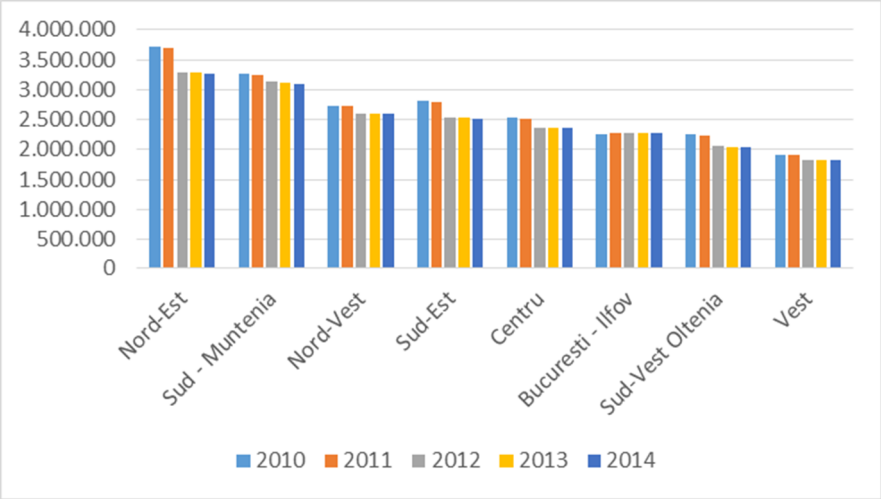
The first step of the analysis is to define the status quo, by summarizing the position of the 8 Romanian development regions in the European context, in terms of regional development indicators. Thus, we begin to analyze each type of indicator, the aim being to identify gaps and the possibility of leap frogging through a qualitative analysis.

The first element to consider is descriptive demography. In 2014 (January 1), Romania is included in Eurostat as having 19,947,311 inhabitants, ranks 7th among the countries, and having just a few inhabitants more than Germany's Nordrhein-Westfalen region.

The largest region is the Nord-Est, with more than 3.2 million inhabitants and is smallest is Vest with 1.8 million inhabitants. Such a disparity can be credited for the initial condition of potential development, a larger population creating the potential base for a larger probability of entrepreneurial approaches and innovations. The trend is the decline in population in all regions, as can be seen in the following figure.

Figure 1

Demographic trends in the Romanian regions 2010-2014



Source: Eurostat (2015)

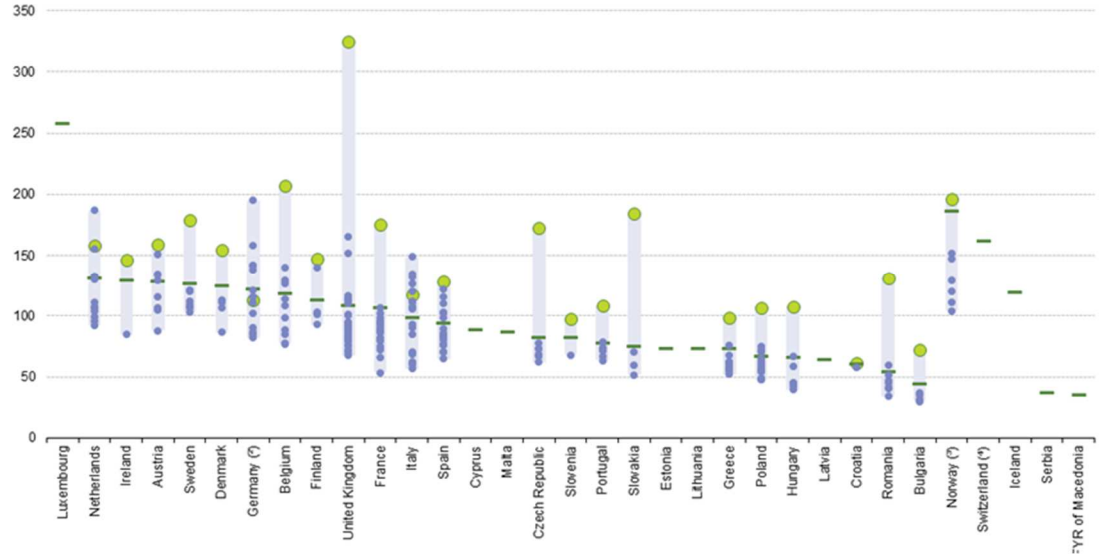
As can also be seen in the findings below, this demographic indicator has the disadvantage of not including human resources from other regions, which adds value to the analyzed region (migrant workforce).It is the case of regions with the country capital, that catalyze a large number of non-residents, including from neighboring countries, such is the case in Luxembourg.

Another important indicator for highlighting the situation of Romanian regions is GDP / per capita in PPS. The latest Eurostat data refer to the year 2014 (2013 being the base year chosen for cluster analysis as it is the lowest common denominator in terms of data availability). Moreover, for the 2014-2020 financial programming period there is even a proposed classification of European regions:

Least developed regions - with a GDP <75% of the EU27 average

Transition regions - with a GDP between 75% AND 90% of the EU27 average
Developed regions - with GDP> 90% of the EU27 average
In 2014, Romania (national indicator) was at approximately 54% of the EU27 average. Regionally, except Bucharest Ilfov, all the other regions fit into the first category, moreover, 5 of the 7 regions placing below the critical threshold of 50% of the EU27 average, the exceptions being Vest and Central regions.
At European level, the highest GDP / capita in PPS is held by Inner London region with 80.300 EUR, followed by Luxembourg with 65.200 EUR, all other regions having a per capita level below 50.000 EUR. EU-28 average GDP/capita is placed around 26.600 EUR in 2013 (Romania - 14.500 EUR – or -54.5%) and in 2014 rose to 27.300 EUR (Romania - 14.600 EUR - 53.4%). Regional disparities are however more than evident at the EU level, the highest GDP / capita of a region (Inner London) is 11 times higher than the lowest GDP / capita of the last region of the ranking (Severozapaden (Bulgaria)). This may also be seen in the figure below, which captures differences between the capital (green), the national average (blue line) and the rest of NUTS 2 regions in that country (blue).

Figure 2
Regional disparities in the European Union according to statistics from 2013



Source: Eurostat, 2015

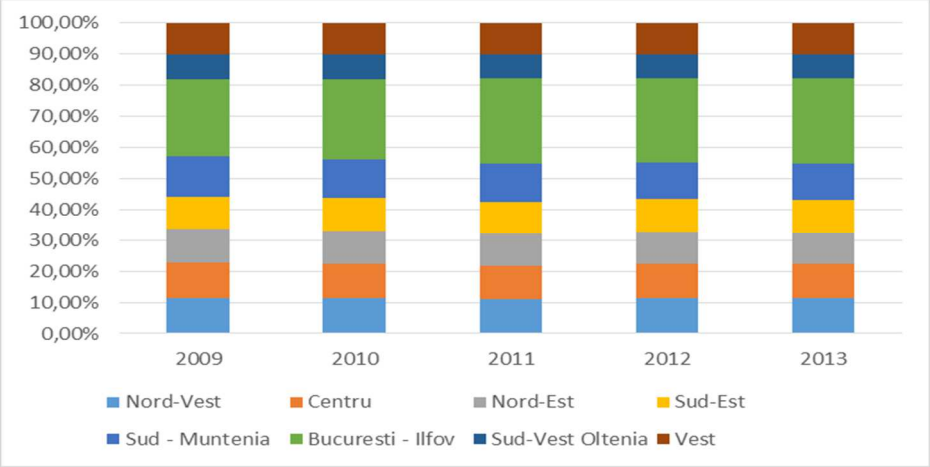
Although the UK has the highest disparity between the center and the periphery (the region of Inner London has a GDP / capita of about 5 times higher than the least developed regions), we can assume that this is due to the specific nature of this region (strong center financial hub and innovation centre) , especially given that the least developed region is approximately 2/3 to the European average.

The largest contribution to Romania's national GDP is brought by the Bucharest-Ilfov region, with a growing share of about 25% in 2009 to almost 27.5% in 2013. This actually comes to stress once again the failure of the measures implemented so far to reduce regional disparities. The smallest contribution is brought by Sud-Vest Oltenia, with 8% in a very slight increase, followed by Vest region with 10%. As

can be seen in the following figure, the weights are relatively stable without any prerequisites towards any future major structural changes.

Regarding real growth rate of gross value added, a relevant indicator for the region's ability to generate value for Romania, Eurostat shows only national data (although nama_10r_2gvagr reference table refers theoretically to NUTS 2 regions). The situation is not unique, and in the case for Hungary, for example, we can see the same gap.

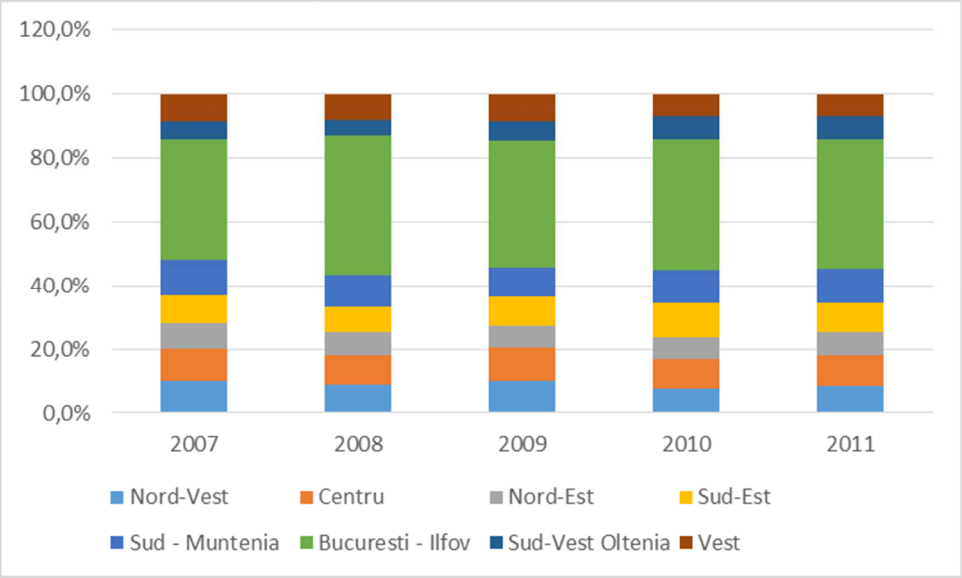
Figure 3
Romanian regions contribution to national GDP between 2009-2013



Source: Eurostat (2015)

Gross fixed capital formation (available through ESA 95, which ends in 2011) reflects a similar situation, with Bucharest Ilfov region responsible for about 40% of national indicators, other regions (except Sud-Muntenia) ranking below 10% throughout the reporting period (2007-2011). To be noted that in Poland, the absolute level of gross fixed capital for the entire period reported was double than the same indicator for Romania.

Figure 4
Gross fixed capital formation in 2007-2011 - the contribution of regions to national indicators



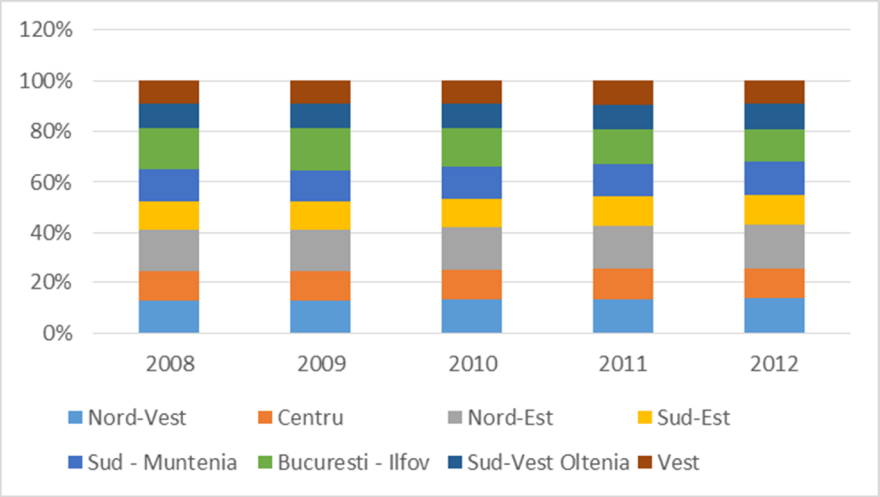
Source: Eurostat (2015)

The presentation of the position of Romania continues with information on the number of students, relevant for the potential future innovation and sustainable growth. Thus, we refer to the situation of Poland, for example, where the number of students per capita is similar to Romania (22 - 20 Romania versus Poland). The highest number of students is in the Nord-Est region, boosted by the university center Iasi (about 17% of the total), while in the case of Poland, the largest number (15% of the total) is observed in the region of the greatest growth potential, namely Mazowieckie.

Distribution in terms of this indicator is more uniform, stressing the importance of at least one major university center per region. Taking

into account legislative changes, implementation of the Bologna system, which follows the principle of student funding and increasing interregional mobility of students, usually caused by seeking financed from the state budget, this uniformity becomes easier to explain.

Figure 5
Distribution of the number of students nationwide in 2008-2012 by region

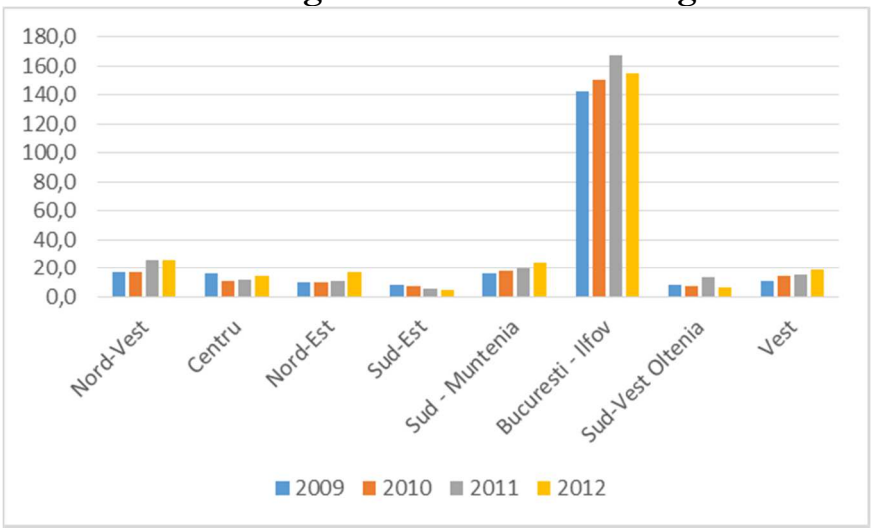


Source: Eurostat (2015)

As regards expenditure on research and development per capita, the situation is as follows: an European average of 533.1 Euro, with Romania allocating 32.1 Euro / person (2012). For comparison, Bulgaria allocates 34 euro, Poland 90.1 euros and Hungary 126.6 euros. Things are no better at regional level. Poland's most developed region (Mazowieckie) has a level 2.5 times higher than the national average (222 euros), while in the case of Romania, Bucharest - Ilfov is almost 5 times higher than the national average (155 euros), being its main driver. Southern regions (Sud-Est and Sud-Vest Oltenia) allocate

the least, being at a level below 20% of the national average (less than 10 euros per capita).

Figure 6
Allocations for research and development expenditure per capita in the regions of Romania during 2009-2012



Source: Eurostat (2015)

Conclusions

In the context of regional development, global and European concerns regarding this elements, focus on resilient cities, centripetal forces driving the creation of super flexible urban centres, surrounded by poor regions, the topics of flexibility, sustainability and resilience are evermore important in academia and on the decision makers' agenda. Should there be investment in a region or in a city? Should the focus be on the capital or on the poor regions? Should investment be concentrated towards catching up and convergence or towards leap-frogging and growth? These are questions to which this paper only

claims to provide a brief introduction and are bound to be found in further research, even if answers will still prove to be elusive.

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References

Akerlof, G.A. (1970). 'The Market for 'Lemons': Quality Uncertainty and the Market Mechanism'. *Quarterly Journal of Economics* (The MIT Press)

Andriani, L. (2013). Social Capital: a Road Map of Theoretical Frameworks and Empirical Limitations (No. 1). Birkbeck Department of Management., http://www.bbk.ac.uk/management/our-research/wp/WP1.pdf , accessed 31 March 2015

Anggraeni, E., Den Hartigh, E., & Zegveld, M. (2007). Business ecosystem as a perspective for studying the relations between firms and their business networks. In ECCON 2007 Annual meeting. http://www.chaosforum.com/docs/nieuws/bes.pdf accessed 31 March 2015

Arrow, KJ., (1962) 'The Economic Implications of Learning by Doing'. *Review of Economic Studies* (The Review of Economic Studies) 29 (3): 155–73

Arrow, KJ., (2009),'Some Developments in Economic Theory Since 1940: An Eyewitness Account', *Annual Review of Economics*, Vol. 1: 1-16 (June 2009)

Battistella, C., Colucci, K., De Toni, A. F., & Nonino, F. (2013). Methodology of business ecosystems network analysis: A case study in

Telecom Italia Future Centre. *Technological Forecasting and Social Change*, 80(6), 1194-1210.
Becker GS (1964, 1993, 3rd ed.). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Chicago, University of Chicago Press
Camagni, R., Capello, R., & Chizzolini, P. (2008). Regional competitiveness: towards a theory of territorial capital. Modelling regional scenarios for the enlarged Europe: *European competitiveness and global strategies*. Chizzolini P and Frasati R (eds), Springer-Verlag, Berlin.
Capello, R. (2007), Regional Economics, London: Routledge.
Capello, R., Caragliu, A. And Nijkamp, P. (2011), Territorial Capital and Regional Growth: Increasing Returns in Knowledge Use. *Tijdschrift voor economische en sociale geografie*, 102: 385–405.
Dinga, E (2007). Sisteme disipative, Entropie şi Sustenabilitate, http://www.edinga.ro/files/studii/9_ro.pdf Accessed 31 March 2015
Drucker, P. (1985), 'The Discipline of Innovation', *Harvard Business Review (HBR)*, May-June, 1985
Florida, R. (2002). The Rise of the Creative Class: And how it's transforming work, leisure, community and everyday life. New York: Perseus Book Group
Iansiti, M., & Levien, R. (2002). The New Operational Dynamics of Business Ecosystems: Implications for Policy, Operations and Technology Strategy: Division of Research, Harvard Business School.
Iansiti, M., & Levien, R. (2004). 'Strategy as ecology'. *Harvard Business Review*, 82(3).
Iansiti, M., & Levien, R. (2004). The keystone advantage: what the new dynamics of business ecosystems mean for strategy, innovation, and sustainability: Harvard Business Press.
Iansiti, M., & Richards, G. (2006). Information technology ecosystem health and performance: Division of Research, Harvard Business School.

Iansiti, M., & Richards, G. L. (2006). Information Technology Ecosystem: Structure, Health, and Performance. Antitrust Bull., Division of Research, Harvard Business School, 51, 77.

Isenberg, D.J. (2010). 'How to start an entrepreneurial revolution'. *Harvard Business Review*, *88*(6), 40-50.

Isenberg, DJ. (2011). The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship. Institute of International European Affairs, Dublin, Ireland.

Jacobides, M. (2013). Creating and Capturing Value in Your Business Ecosystems – TedXTalks: http://www.tedxthessaloniki.com/index.php/talk_video/creating-and-capturing-value-in-your-business-ecosystems/#sthash.wUfQjlTZ.dpuf, Accessed 31 March 2015

Lucas, R. (1988), 'On the mechanics of economic development', *Journal of Monetary Economics*, 22, 3–42.

Nistoreanu, B. G., & Gheorghe, G. (2014). 'The Perception of the Academics and Students Regarding the Entrepreneurial Education in Economic Education'. *The AMFITEATRU ECONOMIC journal*, *16*(37).

OECD (2001), OECD Territorial Outlook. OECD Publishing

Pamfilie, R., Giusca, S., & Bumbac, R. (2014). 'Academic research–a catalyst for the innovation process within companies in Romania'. *The AMFITEATRU ECONOMIC journal*, *16*(37).

Romer, P. (1990), 'Endogenous technological change', *Journal of Political Economy*, 98, S71–S102.

Solow, RM (1956). 'A Contribution to the Theory of Economic Growth'. *Quarterly Journal of Economics* (The MIT Press) 70 (1): 65–94

Stiglitz, J and Greenwald, B. (2014) Creating a Learning Society – A New Approach to Growth, Development and Social Progress, Columbia University Press