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Integrative innovation as core determinant for sustainable progress

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Abstract

Integrative innovation is a core determinant of competitiveness and sustainable progress. This is confirmed by the history of Nature and Mankind. The present work defines in a systemic manner the typology of innovation and integrative sustainable innovation, based on new models: a general model of the cycle of change in the Universe / Multiverse, a general correlation model environment – resources and a model of innovative clusters. It critically examines the current state of innovation and proposes principle ways to improve the integrative innovation in the European Union and Romania.

Keywords: integrative innovation, innovative clusters, competitiveness, sustainable progress, European Union, Romania

1. Introduction

In the Universe / Multiverse progress, stagnation and regress are the categories of becoming / changing (continuous in t time, periodical by behavioural c cycles and g parallel-successive generations of systems) made in the domains space-time-resources $D_{str}(t,c,g)$ of various dimensions, hierarchies, self-included diversities, characteristics and duration of existence. Progress (based on innovation and competitiveness), stagnation (based on conservation) and regress (based on recycling of the uncompetitive entities) are carried out through and within the life cycle frames of systems $S_R(t,c,g)$, components of the different domains $D_{str}(t,c,g)$.

Progress in the Universe / Multiverse is defined by the evolution of systems characterized by gradually, periodically increasing (through behavioural cycles c and generations of living g), optimized, temporary or durable / sustainable (unlimited)

- of competitiveness $K(t,c,g)$ (competing capacity, flexibility of products offer, value of products offer, availability

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of resources, efficiency, demand and / or acceptance in the proximate external environment),
- of structural-functional complexity W(*t,c,g*),
- of structural-functional diversity Z(*t,c,g*),
- of structural-functional integration J(*t,c,g*),
- of welfare B(*t,c,g*)

of entities in the hierarchy of internal and external system environments in a space-time-resources domain $D_{str}(t,c,g)$.

Achieving sustainable progress is recognized as the main challenge for Mankind in the next billion years to come of planet Earth, within the solar system of our galaxy and in other star systems that provide or will provide life with favourable conditions, similar to those of our planet. Sustainable progress has two major categories of determinants: natural and anthropogenic. In all models and definitions of progress natural and anthropogenic integrated innovation is identified or self-understood as a crucial determinant (Teilhard de Chardin, 1948/1956; Moore, 1994; Wright, 2001; Meadows, 2004; Hughesa and Johnstonb, 2005; Wright, 2005; Canada Sustainable Future, 2010; European Union, 2010; González Márquez et al., 2010; European Commission, 2012).

Definitions of *innovation available in dictionaries* that fit the ideas and concepts used in this work are:

- 'making changes to something already established by introducing something new' (The New Oxford Dictionary of English, 2010, p. 942),
- 'introducing something new' (Merriam-Webster Dictionary on line, 2011).

However, the large number of definition and analyses of innovation has been developed in the last century, in a relatively limited vision, as man-made products and processes are concerned (Schumpeter, 1939; Schumpeter, 1942; Jansen, 2000; Johannessen, Olsen and Lumpkin, 2001; Shavinina et al., 2003; Carlson and Wilmot, 2006; Sawhney, Wolcott and Arroniz, 2006; Winder, 2007; Baregheh, Rowley and Sambrook, 2009; O'Sullivan and Dooley, 2009; Keeley, Walters, Pikkel and Quinn, 2013). This way of defining innovation concept prevails in the definition, analyses and current projects in the European Union (OECD, 2005; Romanian Government, 2008; European Commission, 2010; European Commission, 2013; World Economic Forum, 2013; Lawson, 2013). Responsible innovation (World Bank, 2010; Owen, Macnaghten and Stilgoe, 2012; Owen et al., 2013), social innovation (Phills Jr., Deiglmeier and Miller 2008; Bassi, 2011; Rodin et al, 2013) defined and promoted during these years, expand the content of the innovation concept, while focusing on anthropogenic issues.

The expansion of the complex crisis the European Union has been facing with after 2007 is actually a consequence of innovation traditionally non-integrative and partially-integrative from Europe. The insufficiently integrative innovation has determined the relative decline of competitiveness in the European Union.

The present work aims at clarifying and contributing to a systemic characterization of the innovation concept and stages, at defining integrative innovation in accordance with the concept of sustainable progress in the Universe / Multiverse.

2. Innovation of systems

In the history of Nature and Mankind, innovation has been, is and will be a function, a decisive process of the change (progress, stagnation and regress) and a fundamental determinant of the progress. This aspect should be reflected in the definition of systems innovation.

In general, *innovation* I(*t,c,g*) is the continuous (time *t*) and periodic (cycles *c*, generations *g*) application of various novelties $N_s(t,c,g)$ generated, required, accepted, selected under natural or artificial conditions (anthropogenic) and applied in the space-time-resource domains.

The innovation I(*t,c,g*) of an existing natural or anthropogenic system S(*t,c,g*), lawfully imperfect, (objects of innovation: components, inter-connections, structures, functions, boundaries / interfaces, running / behaviour programs, transformation processes, states, internal and external environments, inputs and outputs, performances etc., the whole system S), shall be achieved continuously and periodically, unconsciously and / or consciously, *multi-staged*:

(1.1) initial germination (*c, g*) through the appearance (unconscious or known) and the definition (unconscious / conscious) of a problem to be solved, without explanation / by statement of the theme for a new solution $N_s(t,c,g)$ for