THE ROLE OF REGIONAL ECO-BIO-ECONOMIC CLUSTERS IN THE SUSTAINABLE DEVELOPMENT OF SMALL AND MEDIUM ENTERPRISES

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Abstract: *"Green economy" becomes more and more utilized worldwide being defined also as a process and objective. The new economic paradigm of eco-economy introduced a new concept, namely eco development or sustainable development that is growing worldwide. While non renewable resources reduced, in the last years an increasing number of countries have adopted measures to implement the concept of sustainable development. At the micro level it can be noticed also that an growing number of organizations chose to activate under the paradigm of "green economy". Regardless if we refer to micro or macro level the leaders understand the need of infrastructure investment, equipment and technologies that will protect the environment but also will promote social responsibility activities.*

Keywords: bioeconomy, eco-bio-economic clusters, SME's, cluster
JEL Classification: O33, O32, P41

1. Introduction

A geographical concentration of economic entities made out of specialized suppliers, service providers, firms from related industries, associated institutions (universities, research institutes, governmental agencies, professional training centers, etc.) form a **cluster.** The cluster type entities create the premises of a sustained development for its members,

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through constant cooperation, innovation and know-how. Bioeconomy is an economic subject mainly initiated and developed by our illustrious economist Nicolae Georgescu Roegen, who especially uses the process of entropy in the analysis of the economic processes. His main paper is "The Law of Entropy and the Economic Process", published in 1971. Considering the classical liberal economy as too mechanical, the author puts into the spot light the contradiction between the second law of thermodynamics, the law of entropy (the degrading of energy and matter, of the natural resources useful to mankind) and the limitless economic growth phenomenon. N.G. Roegen has analyzed the economic growth phenomenon, recently transformed into sustainable decrease, taking into consideration the law of entropy. Researchers associate to the economic processes not only an immaterial value, but the value of matter and energy, which is degrading in an irreversible manner, passing from a low entropy to a high one, beyond the different transformation processes. Bioeconomy is an alternative to the capitalist economy. Contrary the economic models specific to the last known economic and social systems, bioeconomy is based on the mechanisms of the living. It considers humanity as a living organism in which the human individuals are comparable to cells; enterprises, regions or states to tissues and organs, public services fulfilling the indispensable organic functions.

2. The transition toward knowledge based on bioeconomy

Bioeconomy refers to the sustainable development and the transformation of the biomass into a wide range of food, health, fiber products, industrial products and energy. The renewable biomass may enclose any biological material considered as a product in itself or which is going to be used as raw matter. The biomass contributes with 14% to the world consumption of primary energy, and for three thirds of the Globe's population living in developing countries it represents the most important source of energy. At the level of the European Union the creation of 300.000 new jobs in the rural environment is estimated only from exploiting the biomass. Eco-Bio-Economy is a scientific, economic and philosophical attempt dedicated to developing the integrated health of the environment, of the welfare of human kind through an integrated multi-polar eco-bio-economic concept which promotes the "Agrifood Green Power" and the "Smart Sustainable Integrated Development" of the future.

The transition toward knowledge based bioeconomy (KBBE) is already unfolding in many parts of the world, fuelled through massive investments and new political measures necessary for the new industries. In figure 1, are represented the interdependencies between bioeconomy, the natural, economic and social environment.

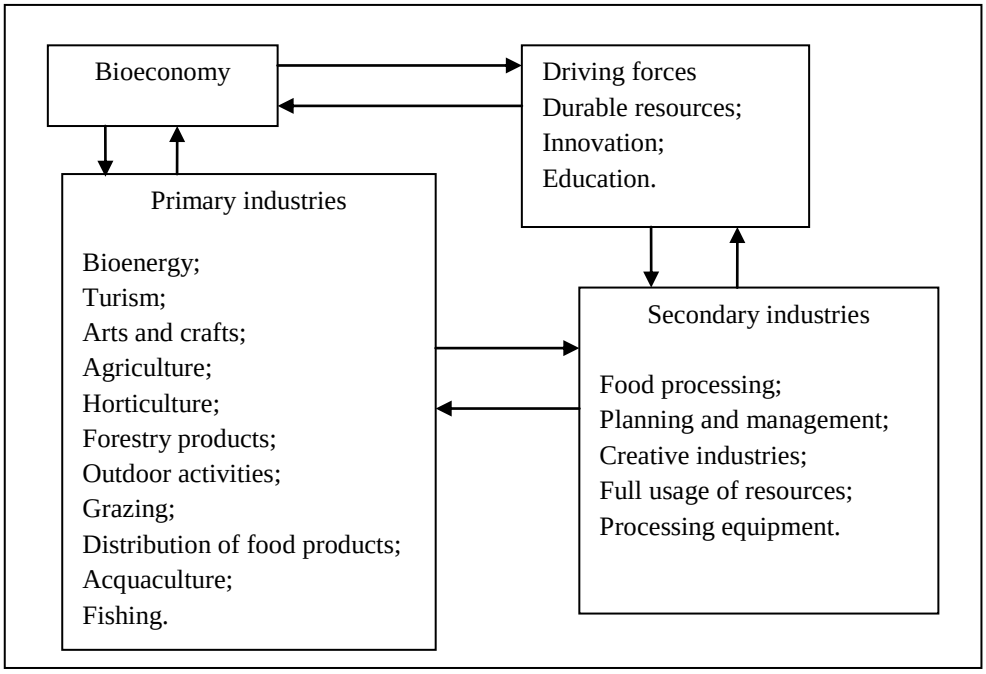

Figure 1. The interdependency between bioeconomy, the natural, economic and social environment

Eco-economy (ecological economy) is a concept suggested by Lester R. Brown which refers to an economy that can be developed on a long term, without affecting its own support system (the environment). The regulation sciences include problems such as: regulations regarding writing, risk management, incumbency regarding issuing declarations/certificates of conformity, regulation and public right (with a significant impact on the commercial entities, as well as on the governmental and public bodies). The translational sciences represent an intersection of interdisciplinary scientific research, driven by the need of practical applications that help people. This term is especially used in the medical sciences.

At European level, one of the most important international organization in the field of biomass is the "European Association of the Biomass" (AEBIOM), founded in 1990 which reunites 30 national associations and 70 companies from all of Europe.

The main activities of AEBIOM are: organizing lobbies alongside European institutions; implementing an efficient network between the association's members; project management at the level of the EU; activities of communicating and disseminating information; organizing events (annual conferences and workshops). A series of recent studies have assessed the regional and global availabilities regarding the biomass, the main results being mentioned in table 1.

Table 1 - The technical usage and development potential of bioenergy until 2050 (EJ/year)

No. Crt.	Important issues	1998	2012	Minimal estimations 2050	Maximal estimations 2050
1	Supply with primary bioenergy		50 EJ		
2	Strategies having as target group technologies based on bioenergy			150 EJ	150 EJ
3	The implementation potential of the technologies based on bioenergy			100 EJ	300 EJ
4	The technical potential of bioenergy supply in 2050, out of which:			367 EJ	1548 EJ
5	Bioenergetic wood cultures grown on fields – other than the agricol ones			232 EJ	1350 EJ
6	The technical wood potential obtained from natural forets (the overstock growth of forests)			59 EJ	103 EJ
7	Agricol and forestry waste and residues			76 EJ	96 EJ
8	The probable implementation potential of bioenergy based technologies			80 EJ	190 EJ

No. Crt.	Important issues	1998	2012	Minimal estimations 2050	Maximal estimations 2050
9	The usage of biomass for food, different materials and traditional bioenergy	273 EJ	340 EJ		
10	The demand of primary energy at global level	418 EJ	507 EJ	601 EJ	1041 EJ
11	The population (billions of inhabitants)	5,9	7	8,8	8,8

Sources: Smeets a.o. (2007), IPCC (2011), IEA (2012)

3. Defining and implementing the creative bio-communities

An important step in creating a network or an efficient and durable strategic association is the existence of a regional community interested in the society's past, present and future. A "community" should be defined as a group of individuals who share similar interests, which include some or all common elements: geography, history, objectives, culture, economic and social structure. A "creative bio-community" should be defined as a micro-community with interdisciplinary character, benefiting from a high ecological conscience, belonging to a restricted geographical region (group of localities, county), which have several shared interests in fields such as eco-bio-economy and the usage of alternative energy resources, whose members, organizations and institutions work as a team in order to maximize the usage of the bio-technologies, eco-management and sharing the acquired knowledge in order to transform the quality of their life and of future generations in a significant manner.

The prototype of a creative bio-community is based on an aggregation of eco-bio-logistic components such as: minimal network of road and rail infrastructure, possibilities to cooperate at regional, national or international level; the average development of TIC and the necessity of some average abilities for the community's members to exist in this field; favorable conditions from the point of view of the environment's characteristics; biological agriculture and permaculture; the education/culture level of the community's members; the existence of consumers and of a sustainable consumption of durable products; the level of fiscality. The ration between taxes and grants; the geographical proximity to the main suppliers, producers

and consumers; the possibility to develop in the near future an electronic type of commerce; involving the pre-university and university teaching units in the activities of the bio-community; developing new curriculum areas specific to durable development in general and of eco-bio-economy especially; balancing the economic development plans at regional and local level; the necessity for the creative bio-communities to have autonomy in taking decisions; attracting potential investors from among external collaborators/partners, as well as from among internal economic and business communities. The holistic model of a creative bio-community can be presented as in figure 2.

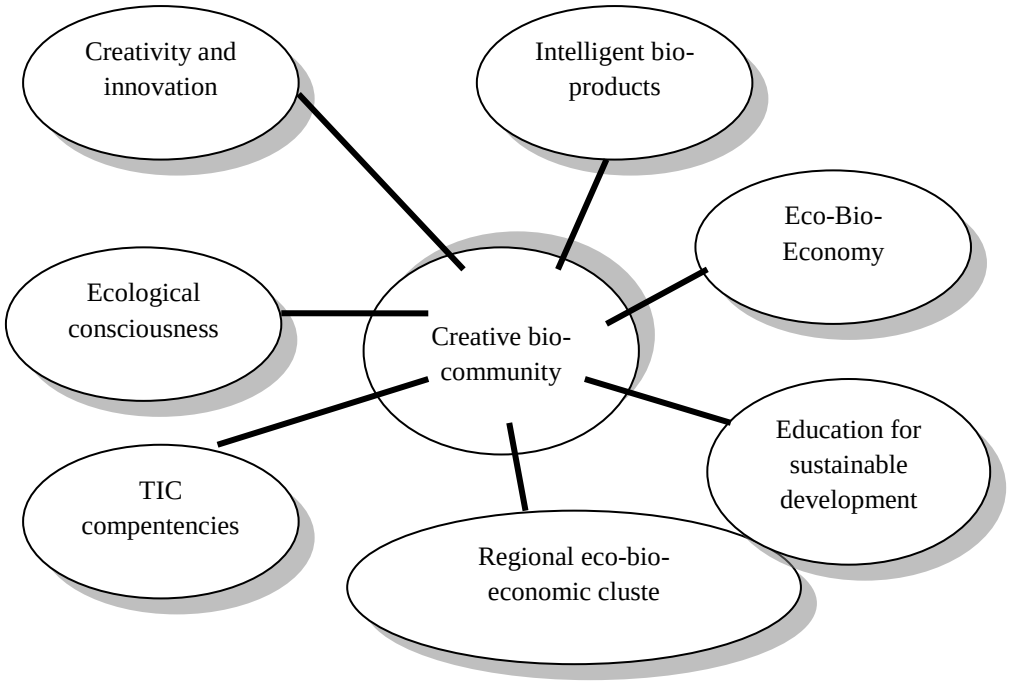

Figure 2. The holistic model of a creative bio-community

4. Defining and implementing a new cluster model

Economic practice has validated the model known in the specialized literature as the "triple helix" which reunites inside a cluster representatives of:

Enterprises – representing the economic side of the cluster; Universities and research institutes – representing the supplier of innovative solutions applicable to the real needs of the enterprises inside the cluster; local, regional public authorities. However, experience has showed that in Romania the 3 natural partners of the "Triple helix" model do not cooperate, more than that, they don't even know each other and they never get to talk to each other. Because of this, it was felt that the model needed to be adapted and transformed into a "Four Leaf Clover" model, the forth actor being represented by catalyst organizations – consultancy firms specialized in the fields of technological transfer and innovations, technological transfer centers, etc. Starting from the attempt to unite the eco-economy and bio-economy concepts under a new integrated concept, "Eco-Bio-Economy", belonging to PhD Professor DHC Alexandru T. Bogdan, associate of the Romanian Academy, we have tried to create a new model of sustainable development of Romanian SMEs through a regional eco-bio-economic cluster, model which combines the characteristics of three cluster categories: the bio-cluster, the cluster for research in education, sustainable development and social inclusion and the innovative regional cluster (Figure 3)

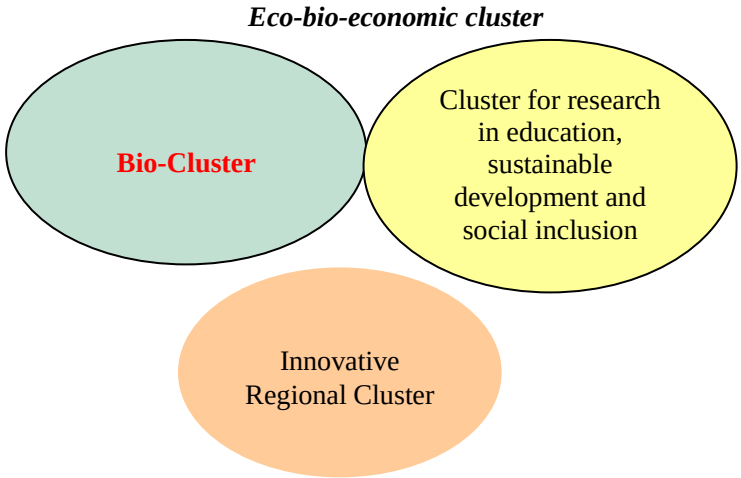

Figure 3. Model of the eco-bio-economic cluster

The evolution of clusters, in the context of sustainable development and, the need to adapt to change have led to the necessity to implement a new cluster model, "Five for all", which can no longer be "Four Leaf

clover", it needing an additional element (element no 5), in fact a regional creative sustainable development network, being based on the American concept "Smart community" made out of five categories of managers belonging to the cluster's organizations and also to the stakeholders, a network with a decisive role in the decisional processes at regional level, further known as "Smart network": Knowledge Manager; Senior Sustainable Development Manager; Migration Manager; Facilities Manager; Transverse Manager. An innovative regional cluster has as purpose to stimulate innovation activities by promoting the interactions supported amongst its members (supporting the involvement of companies in collaborative activities of research-development-innovation, exchange of facilities and know-how) and supporting the actual contribution to research, development, innovation, technological transfer, networking and information dissemination amongst cluster members.

At the level of the European Union, the innovative clusters are considered the engine of economic development and innovation, these two representing a proper framework for businesses to develop, for companies, universities, research institutions, suppliers, customers and competitors in the same geographical area (local, regional, national, trans-national) to collaborate amongst themselves. Among the objectives of an innovative regional cluster, according to the "Guide for implementing the innovative cluster concept in Romania" (2009), we can mention: the making and promotion of networks between organizations, promoting the expansion of existing companies, creating a regional brand, promoting the exports of the cluster, promoting the creation of spin-offs (enterprises whose activity resides in applying or using the results of the development research activity within a University or a Research Institute), facilitating/promoting green/alternative, innovations and technologies. The requests for creating a new cluster are: regional sustainable eco-bio-economic development, supporting entrepreneurship and stabilizing the work force in the region; Increasing the degree of employment and reducing unemployment; Changing the psychology of communities regarding sustainable development and increasing their level of ecological consciousness; Creating new study courses and occupational standards necessary for sustainable development and for the "green" labor market; Improving communication between consumers, producers (especially regarding the problem of consumption and sustainable production), education institutions, research centers and public authorities; increasing the cohesion at

regional level between rural communities as the main pillar of eco-bio-economy; increasing the cohesion at regional level between companies belonging to the fields of interest of eco-bio-economy. The dimensions of an innovative cluster can be represented suggestively in figure 4.

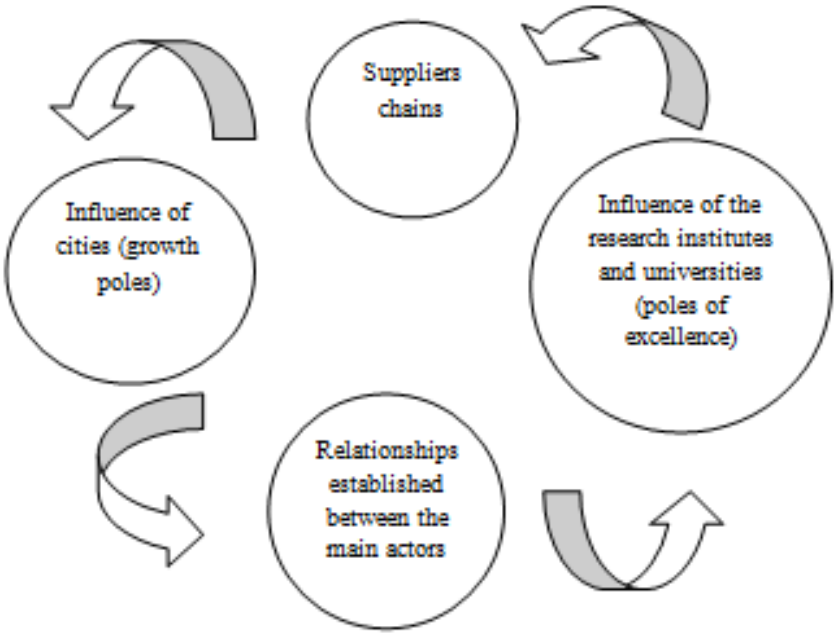

Figure 4. The dimensions of an innovative cluster

5. The role of the unified modeling language (UML) in the process of identifying and capitalizing a cluster's assets

The unified Modeling Language (UML) is the result of a process to introduce standardization in the analysis and design focused on the object. It has represented the starting point in developing graphic languages. The main contributions in defining these unified modeling language belonged to Grady Booch, James Rumbaugh and Ivar Jacobson.UML uses a graphic notation which covers most of the diagram types necessary during the lifespan of software development. The main strong points of UML are the following: it is an object analysis frame, giving different complementary perspectives of the system, which guide the usage of object concepts as well

as numerous levels of generalization which allow the control of the complexity with the help of object solutions; it is a communication support so that the graphic notation allows the visual expression of an object solution; it is a formal and normalized language that offers precision and stability; it ensures independence from the implementation language and the field of application. It is known that in practice, at the level of firms, the tangible and intangible components are creators of added value. The market value of a firm is influenced not only by summing up, according to the accounting books, the fix and mobile means, but also the firm's history, its attitude towards its clients and employees, the development and innovation potential of its products/services, the firm's impact on the environment factors, the firm's innovative attitude, etc.

Generally, traditional accounting is focused on registering and interpreting financial data in accounting documents. In accounting, the flow of intangible assets show the weight of the intangible assets from the total of the assets indicating to the firm the value of the research-development expenses, the expenses regarding the issuance and sell of shares and bonds, etc. These intangible assets can be measured but inside a firm there are also other categories of intangible assets which cannot be measured, such as the value of a data base, the value of some impact studies, etc. Using informatics techniques to quantify the intangible elements in a firm, we have analyzed The Cases diagram – because inside these diagrams different connections may exist that describe the collaboration between actors and usage cases. UML contains some standard types of relationships between actors and usage cases, which are: the association relationship, the extension relationship, the generalization relationship and the inclusion relationship. The diagram of cases for the attitude towards the environment is presented in figure 5.

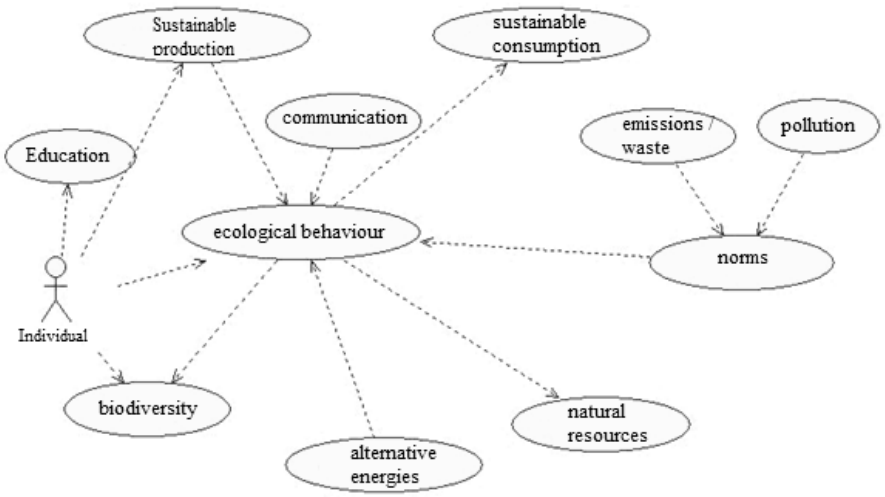

Figure 5. Diagram of the cases referring to the attitude towards the environment

The diagram of the cases for the customer relations management, for identifying the intangible values, is presented in figure 6.

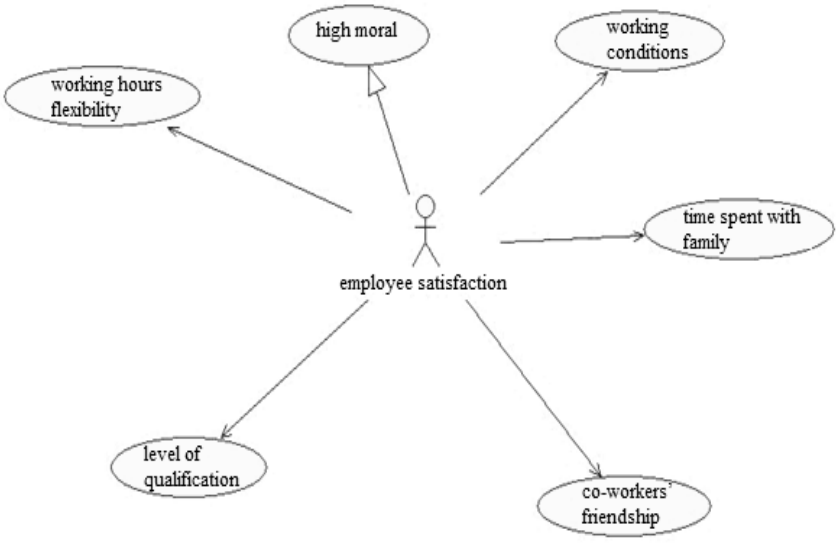

Figure 6. Diagram for employee satisfaction cases – intangible value

There are intangible sources that create added value at the level of each enterprise such as: brand value, initiatives, reputation, fulfilling the legal obligations, social responsibility towards employees, customer relation management, the care regarding identifying, keeping and motivating the company's performant employees; the care regarding the organization's public image, be it in relation to the grand public, NGO's, local communities, etc.; the responsible marketing of its own products; the pro-active attitude which comes from initiatives that go beyond the legal regulations, etc. At the basis of any performing management, for managing the tangible and intangible values from a cluster, are: the leadership-management couple, the organization's structure and the relational capital. The leadership-management couple encloses the organization's strategy and its implementation, transparency, communication, the total of expanses, etc.

The organization's structure encloses the internal technologies and processes, the human capital, the importance of the work place, innovation, the intellectual capital, adaptability and responsibility. The relational capital must enclose the value of the organization's products, the organization's tradition/reputation, different alliances and networks in which the organization is part of, knowing the disruptive factors and quantifying them. Up to the present moment there are no standards, regulations or any other methods that are necessary for reporting the intangible values priory presented. The only intangible components that are registered in the accounting books are the ones accepted by the IAS and IFRS (IAS, 2011; IFRS, 2011), which make reference to: the expenses related to the purchase and usage of franchises, technologies and registered marks; the expanses for research-development; goodwill.

The IAS and IFRS regulations recommend that "goodwill" be explicitly presented in the accounting systems used, so that a justification as to why a company can purchase another company at a value higher than its material, physical value, could be possible. In practice, Goodwill can also be negative if the company does not have a market value that could cover its own assets. We can note that after identifying the intangible components at enterprise level, an analysis of the environmental costs can be made, identifying, where needed, their tangible respectively, intangible character. The architecture used by UML allows the implementation of some reasoning related to performance, availability and security. One of the major advantages of UML consists in the opportunity to introduce in a systematic

manner the additional language elements without involving the modification of the entire modeling environment, such as editors, transformations, etc. The UML uses the standard notation used in most of the software design processes. Aside from the possibility to use diagrams, some of the UML tools can generate codes, can use different models that already exist in designing, can generate reversed engineering codes. The UML is very flexible being able to be adapted to different fields/technologies.

6. Conclusions

Creativity is to a large extent a state of mind, an attitude of individuals and groups, which demands to be formed, developed, starting with the family, kindergarten, school, etc. To have a creative attitude means to find yourself in all circumstances on the side of the new, against the old, to promote originality and value in opposition to non-value, to allow the usefulness and efficiency in the social-economic activity. Improving the sustainable development of SMEs' management through modeling techniques and simulation leads to the study of the connection between the competitive advantages of the eco-bio-economic clusters and the sustainable development processes. The competitive advantages, tightly connected to the organizational performance, are generated through the competitive factors and can be counterbalanced by the non-competitive advantages (owed to some wrong policies/regulations). The early identification of the competitive advantages of the eco-bio-economic cluster type of strategic alliances will lead to a superior capitalization of these advantages if one will first consider the results obtained after the simulation of different activities developed by the organizations belonging to the cluster.

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