INTEGRONIC INTERFERENCES IN THE ROMANIAN BIOECONOMY, WITH APPLICATIONS AT THE FOOD ACT PATTERN

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Abstract*: The paper approaches the model reorientation concerning the alimentary pattern on bioeconomic principles and in the integronic dynamics of the model components. It is analyzed the interference of the agri-forest pasture systems with the agri-zoo-food systems as a harmonization of integronic type in the models of the environment-economy complex systems. As an aim, there is pursued the change of economic paradigm through a networking with the environment resources, linked to the food safety for the decades to come. The paper objectives are linked to the identification of components of the alimentary complex system, referring to agri-food, industrial food and complex food from gastronomy, as well as their interferences through multiple integrations in relation to the impact upon the consuming population. There are described applications referring to the understanding of advanced integration of complex food (dishes) and hyper-complex ones (menus) and of the operational techniques specific to gastronomic engineering.*

Keywords: bioeconomy, food act, gastronomy, integronics.

INTRODUCTION

Starting from one of the most worrying scripts, namely: water and food crisis in the decades to come will be much more serious and devastating than the present economic-financial crisis, to apply bioeconomy principles to the whole food act becomes a viable solution. The essence of the future (under peace conditions) is in fact: food and water of very good quality. That is why food security, sustainable agriculture and bioeconomy need an ever better integration in order to contribute to the human food harmonization.

Agriculture, forestry, fishing and aquaculture, together with industries based on „bio concept", are integrative part of the food act and, of course, of the European society economy. Based on the utilization of limited natural resources, these sectors also produce process biologic resources in order to satisfy the consumers 'demand and a large scale of industries for food products, animal food, bio-energy and basic bio products.

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But unfortunately, in many parts of the worlds, it is observed that, regarded as a whole, we register an ever hungrier planet**.** Subnutrition is particularly severe, especially for children, as it may make them grow up slower and makes them vulnerable to disease. Until the year 2050, we will be approximately 9 billion people on the planet, which means that we will need 70 % more food for equilibrated nourishment. In antithesis, in developed countries, the permanent access to food with a high content of fats and carbohydrates, together with change in life style, makes obesity to become a real problem, as well as other illnesses of the „civilization" [Puelles M., 2004, Gruia R., 2013].

BIOECONOMY is the profound change of world's economic paradigm. To introduce natural environment in relation to demographic evolution in the equation becomes obligatory. But the big practical problem is that, on this basis, there is a harsh fight for what we call strategic resources, i.e. water and food, but also green energy. That is why development shouldn't be made by resource consumption, but, at levels and rhythms that allow their regeneration, by a sustainable development.

Under this context, one must be aware of the place and role of Romania in the globalised bi economy. Thus, we mention that Romania's gold is not the mineral one, buried under the mountain, but the thin layer of fertile soil, to which water is added and our country's exceptional geomorphological conditions. Romanian bioeconomy has all chances to develop extremely well because it still possesses important possibilities to use these resources. ***„Romania's huge capital is given by natural resources":*** out of Terra's 9 bio-geographical regions, Romania detains 5, having the most important eco-region at global level. More than half of the Carpathians, the wildest nature, are in our country. More than half of Europe's big carnivorous is to be found in Romania. Then we have the Danube Delta, the wet zones and virgin forests etc.

We are speaking of a true treasure, much richer than the one Russia has lost, for example, namely the **pure genetic basis** that our country has, being among the very few countries in Europe detaining all these things. If we mention only the 220.000 ha of virgin forest, then the chocolate chernozem, the most productive of all soil types, to be especially found in Dobrogea, one can see the certain capacity to sustainably develop the country. You cannot have durable development without the fundament given by pure natural resources. Romania enrolls in the zone of big traders, being a genetic multiplicative potential for countries that only have financial resources, but not natural ones too (or "have forest, but not woods").

Besides all these, solid knowledge is necessary, in order to successfully negotiate Romanian bioeconomy in severe world competition. In order to consciously negotiate the advantages that food and quality water give you in a world with ever bigger alimentary problems.

Under this context, the objective of the paper becomes more than opportune. With the potential of the enumerated resources (natural, human, material, scientific and even financial ones, taking into account the European funds), multiple and successive integration, under synchronic, syncretic and synergic conditions (S^3) of the system elements, with emergent effect, i.e. in an **integronic** dynamics [Gruia R., 2013], may highlight a **model** with a good **bioeconomic** impact for the whole alimentary chain.

WORK METHODOLOGY

The system analysis has universal applicability. It makes possible the applicability of new theories and concepts. We mention out of these ones the theory of maximum power [Odum, H.T., 1984, Pillet, G., Odum, H.T., 1987] and the concept of emergetic sustainability [Gruia, R., 2002].

The analyses of systems, as the **alimentary system** is too, is a method resulted consequently to defining the theory and the notion of system. This concept, that helps to delimitate the field in which is developed the respective process, may be described by the formula:

$$S = \{X,Y,S_T/A\},$$

Where X represents the multitude of entrances, Y the multitude of exits, ST the multitude of states and A the multitude of operations, or of transformations that the systems makes on entrances X to transform them in exits Y [Birlea St. 1975].

The state represents the values of the system fundamental parameters in a certain moment [Teodorescu, 1978, quoted by Gruia R., 2003], i.e. a succession of characteristic states of the respective system behavior. Thus, besides the analyses if economic efficiency, there may be also made analysis concerning the efficacy of the integrated system, at a level that may surprise implications unsuspected by the traditional economy, speaking here of bio economy. Such a demarche implies to apply the integronic management, by achieving a sustainable development of the integrated economic units, based on mechanisms on direction S3 with emergent effect and it has the potentiality that, through polyvalent interferences, to settle the food act on bioeconomic principles.

RESULTS AND DISCUSSIONS

It is important to take into consideration social, economic and health perspectives, as for foods. International organizations, such as the United Nations (UN), Alimentation and Agriculture of the United Nations (FAO), the Organization for Economic Cooperation and Development (OCDE) and the Health International Organization (OMS) are preoccupied to study, monitor and continuously improve the idea of "food - nutrition - health" all over the world, to

evaluate international prices of major and basic products, as well as to elaborate international policies and protocols concerning food security [Burtin, P., 2003, Agricultural Outlook 2010].

The „agri-zoo-food" sector for secure and healthy alimentation pursues the idea that a transition is necessary towards an optimum utilization of renewable and biologic resources, especially on direction of systems of production and primary processing (sustainable ones). Therefore, the food act as a whole will have to produce more aliments and other basic bioproducts, with entrances that reduce to minimum the impact upon the environment and the gas emission with glass house effect, as well as with improved ecosystem services, wastes approaching zero and adequate social value [Gruia R., 2003].

Consequently, an important step is the holistic approach of the food act, necessary in understanding the links within the system and, implicitly, variants of integration and development (taking also into account disintegration and evolution or involution). To this end we will take into consideration as necessary steps for multiple integrations, *the agri-forest-pasture system* in relation to the *agri-zoo-alimentary system.* The resultant of this interaction is to be found in fact at the basis of the food act regarded from bioeconomic perspective (fig.1).

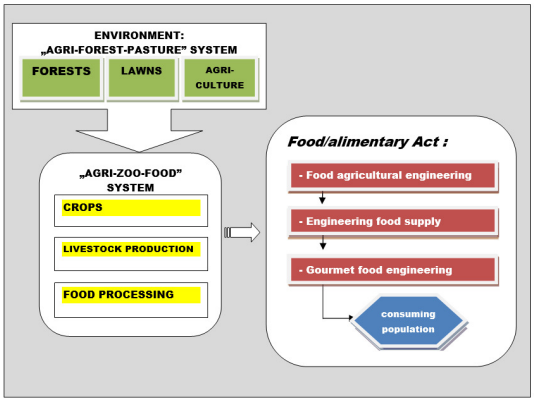

Fig.1 – Block schema of bioeconomic type of systemic inter connexions sustaining the food act in integronic dynamics

From technologic and managerial point of view we distinguish the three integration level chain, which, in current acceptance, represent three distinct fields of the food act: agricultural engineering, food engineering and gastronomic engineering. If agriculture and foof industry are fields with an old scientific, technologic and managerial basis, generally well known, as for gastronomy, the knowledge level is still in systemic organization and with a fragmentary scientific understanding and, not rarely, contradictory.

The shaping of the bioeconomic model of the food act will have to contain, as a complementary element, the elucidation of the gastronomic engineering demarche

[Gruia R., 2008], as well as complex connections between all the three integration levels of the analyzed system.

That is why we consider it opportune to systemically approach all these elements, highlighting **gastronomic engineering** analyzed in relation to the other components of the food act or from the perspective of the level of food elaboration (fig.2).

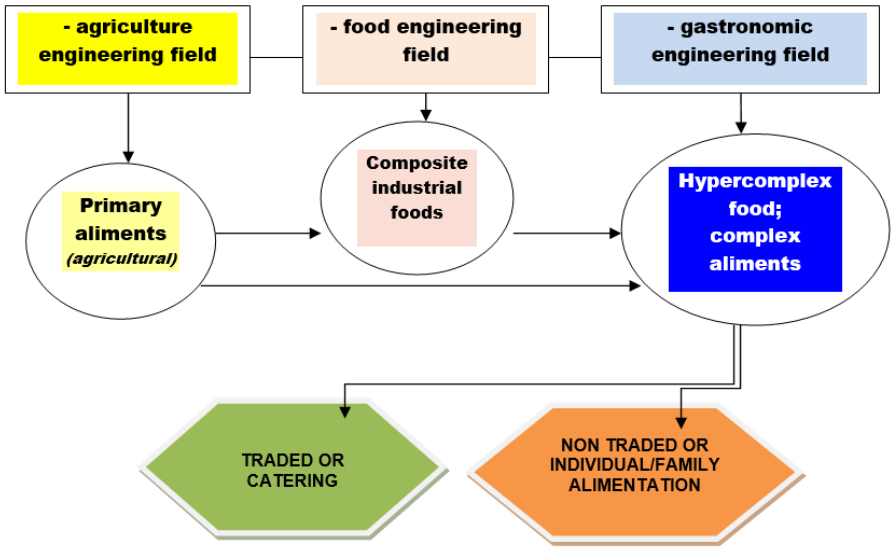

Fig.2. – Structural components of the food act, highlighting the complex impact of gastronomic sciences and techniques

Concerning the gastronomic engineering, the model may be shaped around the idea linked to ***science and art in gastronomy***, where, in function of the origin of the used raw materials, we may speak about „gastronomic botanic", „gastronomic zoology", „molecular gastronomy" and „culinary constructivism", aiming to establish and organize the exchange of knowledge and business in this field. Thus, there may be also structured scientific knowledge for social health and well being, without missing the present perspective, the bioeconomy, which expects to generate wealth and work [Hasler, F.M. 2002, Avalos García, A., and al. 2011; Gomez,A and al. 2012]

If, besides the typology of raw materials there are also taken into consideration elements of operational order, then the analyses of this part of the model may be structured in conformity with the schema from fig.3.

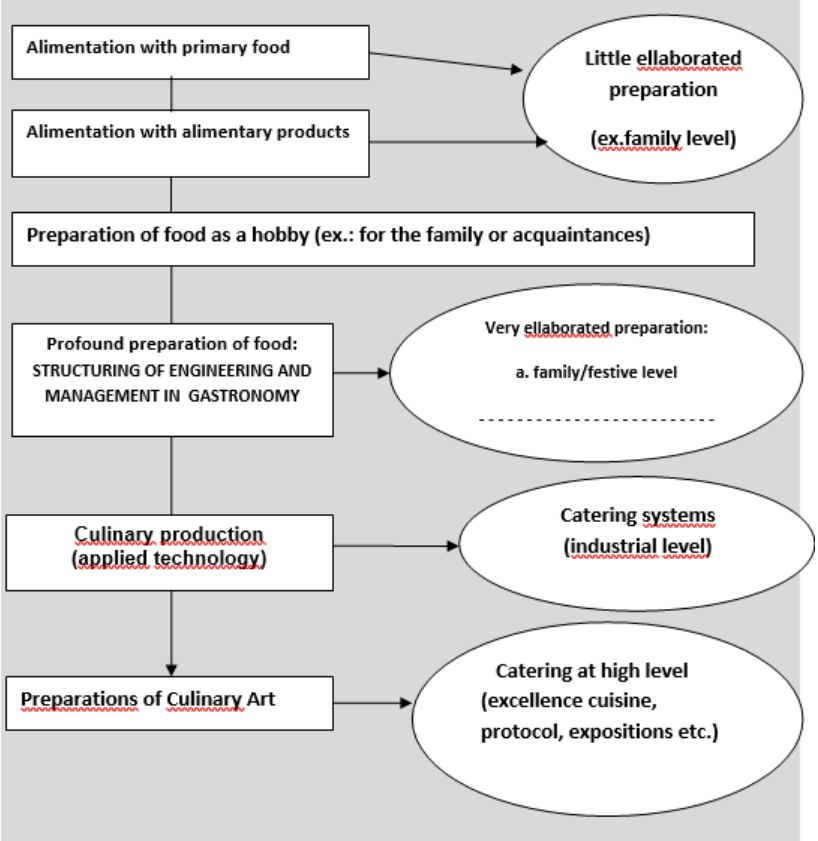

Fig.3 - Activity levels in operational techniques of gastronomic engineering

As it may be seen from what we have presented, the „core" of the food act is aliments with high complexity represented by **dishes and menus**, which need certain explanations and an attempt to define categories of aliments in function of their complexity.

It is known that the food notion means any product, in natural or processed state, that contains nutritive substances necessary to human organism and that is used to maintain its vital activity, not being harmful. Representations (some of them better known, others less known) concerning necessary characteristics to be taken into consideration in the systemic approach are those through which there may be identified the following types of foods. In table 1, foods to be found in the food / alimentary act have been grouped in 4 types of foods: primary, industrial, complex and hyper-complex ones, where **„unitary aliment"** with direct impact upon the organism is considered both dishes, and their combination within menus.

Table 1. TYPOLOGY OF FOODS PART OF THE FOOD ACT

No.	TYPE	DEFINITION	SUBCATEGORIES
1.	**PRIMARY ALIMENTS**	Practically represent ***„agricultural products"***, i.e. soil products, animals, fish and products resulting from first transformation directly resulting from these products.	**- classifications known from agriculture field**
2.	**INDUSTRIAL FOODS**	Represent *de facto* ***„food products"*** obtained in food industry by later transformations than first transformation, respectively processing specific to food engineering that lead to obtaining in fact different preparations	**(a) « Processed » industrial foods**: they are obtained by primary processing or standard fabrication in food industry or in the small farm industry (ex. cereals - flour; sunflower - oil; sugar beet - sugar etc.)
			(b) « Composite » industrial foods: they are alimentary products made in units of food industry based on a ***recipe*** *(preparation of an aliment using a receipt)*, which represents a whole or an unit formed of several parts, respectively an association and/or a combination in a whole of several ingredients formed of raw agricultural material, out of which there is to be distinguished a basic component (matrix), armature elements and fibers for resistance, assuring an ensemble of materials that will confer characteristics that the every material in part DOES NOT have (ex.: bakery products, pastry ones, dairy products, salami and sausages products etc.). --- To distinguish: - classical composite foods - functional composite foods = functional foods

3.	**COMPLEX FOODS**	They represent **MIXED DISHES AND DRINKS** that constitute a whole (based on culinary recipes), or a unit formed by several parts, i.e. a system gathering in itself several elements, respectively an association and/or a combination in a whole of several ingredients formed of raw agricultural material and/or from food industry; **technologically** they represent the use of a complicated combination of advanced preparation techniques, processes and cooking methods, using fresh ingredients (but, complementarily, also conserved ingredients), different textures and flavors, as well as innovative finishing and presentation techniques.	(a) classical complex foods
			(b) functional complex foods = « intelligent » culinary preparations
4.	**HYPER-COMPLEX FOODS**	They represent **MENUS** – they are represented by a group of culinary preparations served as a complete menu at a meal (breakfast, lunch, dinner etc.) representing dishes and drinks that form a ***whole*** or a ***unit*** formed of several parts, i.e. a system gathering in itself several elements, respectively an association and/or a combination **in a nutritive whole („aliment")** of several ingredients formed of simple or composite raw food materials making a ***menu,*** i.e. food at a meal served at a given moment of the day.	(a) hyper-complex foods of classic menu type
			(b) hyper-complex functional foods of prophylactic, health-generating and dietetic menu type

Grouping the types of foods in function of the activity field, the types of made foods, but which are integrative pillars in the food act, they may be found as an inventory in table 2.

Table 2. CATEGORIES OF FOODS, AS PRODUCTS SPECIFIC TO THE FIELD OF CONNEX ACTIVITIES TO THE FOOD ACT

No.	ACTIVITY FIELD	CATEGORY OF PRODUCED ALIMENTS
1.	Classic food industry produces:	- processed foods;
		- composite foods;
2.	Health-generating food industry produces:	- functional foods;
		- nutraceuticals;
3.	Traditional nutritional gastronomy makes:	- classic complex foods (dishes and drinks based on culinary recipes);
		- hyper-complex foods (classic menus);
4.	Health-generating gastronomy and cuisine make:	- functional complex foods („intelligent" culinary preparations);
		- hyper-complex functional foods of prophylactic, health-generating and dietetic menu type.

Scale sizes are sizes completely characterized through a positive or negative number, as, for example, mass, density, volume, temperature, heat, etc., which is to be also found in parameterizing different types and categories of foods.

The main three types of control elements and indicators for scale values are: numerical; logical (booleene); alphanumerical (texts, strings, lines of characters). The interferences of scale elements have also as a result actions in the formation of gastronomic physic-chemical structures (fig.4)

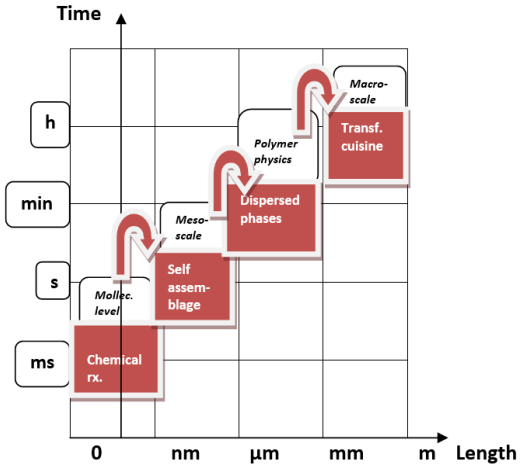

Fig. 4 - Example concerning time and length scale in the formation of gastronomic structures

Structure on types of food categories and subcategories makes possible to pass to their parameterization from polyvalent perspectives, so that there may be analyzed integration phases and characteristics of the newly appeared systems along the alimentary chain. Certainly, here we are only stating a question, the process in itself presupposing a large investigation field in the future.

CONCLUSIONS

1**.** By applying *the integronic management* and achieving a sustainable development of integrated economic units, based on mechanisms on S^3 direction, with emergent effect, through polyvalent interferences, the food / alimentary act is set on bioeconomic principles.

2. *The food act* in its whole will have to produce more aliments and other basic bio products, with entrances that reduce at minimum the impact upon the environment and emission of gas with glass house effect, as well as with improved ecosystem services, wastes almost zero and appropriate social value; an integrative part of the alimentary act on bioeconomic direction are: agriculture, forestry, fishing and aquaculture, together with industries based on „bio concept".
3. To take into consideration, as necessary steps for multiple integrations, the „*agri-forest-pastoral" system* in relation to the „*agri-zoo-food" system,* leads to interactions that stay at the basis of the alimentary act, where, from a technological and managerial point of view, we distinguish the chain of three integration levels, that represent, in current acceptance, three distinct fields of the alimentary act: agricultural engineering, food engineering and gastronomic engineering.
4. Foods to be found in the alimentary act are grouped in 4 types of foods: primary, industrial, complex and hyper-complex ones, where there are considered as *„unitary aliment"* with integronic interferences directly upon organism both aliments from food industry, and dishes and menus in their whole. Therefore, by structuring on types, categories and subcategories of foods it becomes possible to pass to their parameterization from polyvalent perspectives, so that there may be analyzed integration phases and the newly appeared characteristics along the alimentary chain.

References

[1] Avalos García, A. Cifuentes Cuencas,B., Gómez Garay, A., Llamas Ramos, J.E., Martin Calvarro, L., Martín Gómez,M.S., Palá-Paul, J., Pérez Alonso, M.J., Pérez-Urria, E., Pintos
López, B., Puelles Gallo, M., Saco, M.D. (2011). *Gastronomic Botany and Molecular*
Gastronomy. Proceedings of ICERI 2011 Conference, pp. 2631- 2637.

[2] Birlea, St., (1975). *Introducere în cibernetica sistemelor industriale,* Ed. tehnică, Bucure□ti.

[3] Burtin, P. (2003). *Nutritional value of seaweeds*. Electro. J. Environ. Agric. Food Chem. ISSN: 1579-4377.

[4]Gomez,A, Martin,L., Pintos,B., Avalos,A., Martin,S., Perez-Urria,E., Pala-Paul,J., Perez-Alonso,M.J., Puelles,M., Saco,M.D., Llamas,J.E., Sanchez-Ballesta,M.T., (2012): *New approach to gastronomy from bioeconomy and academic activity, in Integration of Agricultural and Energy System*, Universidad Complutense de Madrid (SPAIN), prezentare proiect.

[5] Gruia,R., (2002). *Ecoemergetic theory in sustainable development,* Ed. Universității Transilvania Braşov, ISBN 973-635-022-3

[6] Gruia,R., (2008). *Gastronomic engineering, a distinct direction within food engineering,* Jounal of EcoAgriTourism, Publishing Transilvania University of Brasov, Romania, ISSN: 1844-8577, Vol.4, nr.1-2, 10-16.

[7] Gruia,R., (2003). *Bazele stiintei managementului in ingineria alimentara*, Ed. Universitatii ransilvania Brasov ISBN 973-635-154-8,

[8] Gruia,R., (2013). *Bazele managementului □i direc□iile viitoare de evolu□ie*, Rd. Lux Libris Brasov,ISBN 978-973-131-230-9, 137-197.

[9] Hasler, F.M. (2002). *Functional foods: benefits, concerns and challenges – a position paper from the American Council on Science and Health*. J. Nutr., 132, pp. 3772-3781.

[10] PIMCD nº 47 2011-2012. *Vicerrectorado de Calidad. Complutense University of Madrid.*

*[11]*Puelles, M. (2004). *Distribución Comercial.* McGraw-Hill 84-481-4074-5. 0877

xxx - OECD-FAO Agricultural Outlook 2010.