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SELECTED PAPERS FROM THE
3rd NEEFOOD CONGRESS



Biodiversity

CalitaTerra

Sanogeneous Food

Sustainable Tourism and Hospitality

Ideas and Concepts

News

20-23 May 2015

3rd NEEFOOD CONGRESS

Global and Local Challenges in Food Science and
Technology

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Editor: Gaceu L.



EcoAgriTourism, in the light of its multidisciplinary character, is a wide-open journal which brings together the opinions of specialists from both academic and economic environment, fostering fruitful collaborations.

The journal's structure covers all aspects of the fields approached, the focus being on original and current researches with applications in agriculture, food industry and rural tourism. Collaborators may feel free to undertake biological and technical aspects as well as aspects with social, cultural and environmental impact. Information of general interest is also welcome for the agriecology-food-tourism axis.

Prof. Romulus Gruia Ph. D.

The Journal of EcoAgroTurism aims at approaching analyses, methodologies, options and references within the journal's framework.

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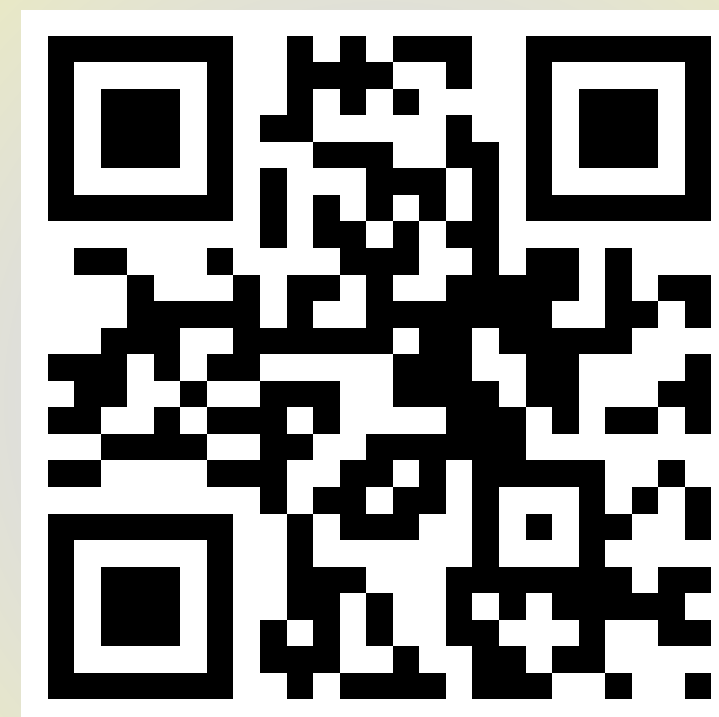
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EDITORIAL

New perspectives...

The Agri-Food sciences, together with Applied Ecology and Tourism Industry make it possible for the “ecoagritouristic” domain to move to another research level in Transilvania University of Braşov. Is relevant that, in addition to the BIOATLAS International Conference, which became well known in the last years in over 30 countries from several continents, in 2015 It was organized another large-scale International Conference: 3rd NEEFOOD Congress Brasov, Romania.

The third edition of the NEEFOOD Congress (North and East European Congress on Food) was organized in Brasov between 20 and 23 May. The event involved the participation of significant international institutions, as EEFOST, IUFOST, GHI, EHEDG, ELSEVIER.

Over 200 participants were presented with the opportunity to get updated on the state of the art of national and international research on food, from multiple perspectives: ecology and biodiversity, public and health promoting policies, management, specific regulations, IT applications, and modern technologies employed in the food industry.

The congress included four other events meant to introduce the activities of several important scientific bodies: The European Hygienic Engineering & Design Group Seminar (EHEDG), The Global Harmonization Initiative (GHI) Seminar, The Sixth Symposium on Ethnopharmacology, The NUTritional LABELing Study in Black Sea Region Countries Seminar.

We note with joy that this event coincided with the jubilee of the Journal of EcoAgriTourism, which after 10 years of activity publishes valuable scientific articles as a result the Journal is indexed in International Data Base since 2009.

Hence, there are serious prerequisites for new step toward advanced research.

Global Harmonization Initiative - GHI

In an attempt to eliminate hurdles, **a network of scientific organizations** has launched a global initiative **to facilitate harmonization of food safety regulations and legislation**. The objective is to discuss, globally, the scientific issues that buttress the decisions made by individual governments and international regulatory bodies in order to achieve global scientific consensus on such issues. The Global Harmonization Initiative (GHI) Working Group anticipates that elimination of the regulatory differences will make it more attractive for the private sector to invest in food safety R&D, consequently strengthening the competitiveness of each nation's food industry and of the industries supplying the food sector. Harmonizing global regulations will facilitate the application of new technologies, encouraging the food industry to invest in such technologies **to ensure better safety and quality for consumers!**

Background

Founded in 2004 as a joint activity of the US-based Institute of Food Technologists (IFT) International Division and the European Federation of Food Science and Technology (EFFoST), the Global Harmonization Initiative (GHI) is a network of scientific organizations and individual scientists working together to promote harmonization of global food safety regulations and legislation.

Drivers for Global Harmonization of Food Safety Legislation








There is no question that the more the avenues of global trade widen, the higher the probability of “traffic jams” in worldwide commerce. Barriers to trade in the form of differing—and sometimes, conflicting—country-by-country import/export rules and requirements, can and do make it difficult for food businesses to get traction in overseas markets. Food safety concerns are frequently cited by individual nations as underpinning the justification for their legislative acts and rulemaking—and for erecting trade barriers and other measures that have the impact of curtailing free trade. Unfortunately, in some cases, the science used to inform and bolster food safety policymaking is insufficient, inconsistent or contradictory, creating a roadblock to the promulgation of laws that have a clear and evident benefit to protecting public health. Differences between countries in food safety regulations and laws also trigger a red light to the advances offered by science and technology. Though many food companies throughout the world have contributed significantly to research and development (R&D) efforts and costs of food safety technology, industry is understandably hesitant to apply newly-developed capabilities on an international scale in an uncertain, maze-like regulatory environment.



Goals

With support and participation of its individual members and member organizations, the GHI's Working Group has conducted a series of meetings at which members have formulated approaches to critically (re-)evaluate the scientific evidence used to underpin existing global regulations in the areas of product composition, processing operations, and technologies or measures designed to prevent food borne illness.

For more information about the Global Harmonization Initiative and its efforts to feed people and fuel innovation through harmonization of science-based global food safety regulations, please visit us online at www.globalharmonization.net.

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MEDICINAL FLORA AND CONSERVATION ISSUES OF PLANT RESOURCES OF “ȚÂPOVA” RESERVATION IN REPUBLIC OF MOLDOVA

GHENDOV V., CIOCARLAN N., IZVERSCAIA T.

Abstract: *The research was conducted in order to identify and document the medicinal flora, including rare and threatened species, in the Landscape reservation “Țâpova”. The spontaneous vascular flora in studied area comprises 571 species of higher plants of 332 genera and 81 families. Among them, 279 plant species contain a wide variety of chemical compounds making them important from pharmacological viewpoint; 85 of them belonging to 36 families and 75 genera are commonly used to treat different ailments. There were 38 rare species revealed in the floristic composition, protected in Republic of Moldova, 29 species are included in the Red Book of Romania. Others 17 species are protected in Ukraine. Four species are threatened on European level and included in the European Red List of plants.*

Key words: *medicinal flora, conservation status, “Țâpova” reservation;*

1. Introduction

The protection of medicinal plant resources was not identified as a major concern of conservation organizations until 1984 [9]. Medicinal plants are an essential part of primary healthcare in most of the world and its continuous unregulated harvest in many developing countries is viewed with alarm the rapidly increasing loss. The Global Biodiversity Strategy recognized the importance of conserving medicinal plant biodiversity [20].

Medicinal plants are both a source of income and a source of affordable healthcare. In Republic of Moldova as a developing country, in some areas local healthcare needs are satisfied primarily using raw materials from medicinal plants. The collection of medicinal plants must be guided by an accurate knowledge of the biology of the species concerned, and steps must be taken to avoid over-exploitation, and the collection of rare or otherwise endangered species [13]. The conservation status of plants is one of most widely used indicators for assessing the condition of ecosystems and their biodiversity. It also provides an important tool in establishing priorities for species conservation.

At the global scale, the best source of information on the conservation status of plants is the *IUCN Red List of Threatened Species* [11, 12]. The Red List is designed to determine the relative risk of extinction, with the main purpose of cataloguing and highlighting those taxa that

are facing a higher risk of extinction. It provides taxonomic, conservation status and distribution information on taxa that have been evaluated using IUCN Red List Categories and Criteria: Version 3.1 [10]. The breeding of medicinal plants with desirable agronomic and therapeutic chemical derivatives makes it possible to conserve and selectively utilize highly valuable *in-situ* germplasm and *ex-situ* germplasm in botanic gardens, and in field seed banks.

Cultivation allows production of uniform materials whose properties can be standardized and from which crude drugs can be obtained unadulterated. Data on plants held in botanic gardens is most readily accessible and a useful starting point. However, the knowledge and collaboration with farmers and traditional health practitioners would be very helpful in identifying, implementing and managing future medicinal plant cultivation. Many medicinal plants grow well on marginal, remote and degraded lands with low monetary inputs.

Intensive studies are needed on selected medicinal plants in order to determine optimum environmental requirements for sustainable production.

2. Methods

The research was conducted during 2007-2013 in the Landscape reservation “Țâpova” situated in central part of Moldova (Orhei district). All selected plant species are native to

local flora and the taxonomy followed by the recent taxonomical literature [2, 3, 8, 15, 16, 19]. Voucher specimens of the plants are lodged in the Herbarium of Botanical Garden (Institute) of ASM (Chisinau). The present account includes all the taxa that are listed under: Environmental legislation of the Republic of Moldova (1996-1998) [14]; The Red Book of the Republic of Moldova (2nd edition) [18]; Red Data Book of Ukraine [17]; Red Book of vascular plants of Romania [7]; European Red List of Vascular Plants [1]; The Annexes of the Habitats Directive [6]; Bern Convention [5]; under The Convention on International Trade in Endangered Species of Wild Fauna and Flora [4].

3. Results and discussions

The flora of the Republic of Moldova comprises over 1820 species inhabiting one of the most fragmented landscape in Eastern Europe with only a tiny fraction of its land surface that can be considered as wilderness [8, 15, 16]. Landscape reservation “Țâpova” is a protected area of national interest (mixed type nature reserve: flora, fauna, geological and landscape), located in Orhei district in vicinity of Țâpova village, territory in administration of Orhei forestry and “Lalova” agricultural enterprise.

The spontaneous higher vascular flora in studied area comprises 571 species, belonging to 332 genera and 81 families, most of which (70.22%) are forest and grassland (steppe) plants. The field investigations and the survey of the scientific references allowed identifying 279 plant species in the area that contain a wide variety of chemical compounds making them very important from pharmacological point of view. The most representative families are *Asteraceae* (44 sp.), *Lamiaceae* (25), *Rosaceae* (16), *Fabaceae* (16) and *Brassicaceae* (15 species). In fact, only 85 of them belonging to 36 families and 75 genera are commonly used to treat different ailments. Most of them are herbaceous, mainly perennial plants. The raw materials are used in many different forms: fresh, powdered, infusions, decoctions, tincture etc. In the most of the cases the vegetal matter is used as infusion. The most important medicinal properties of species in the area are anti-inflammatory, astringent, expectorant, diuretic, cholagogue, hypotensive, cicatrizing. The vast majority of them are mainly used for the diseases related to digestive system followed by urinary

and respiratory disorders. Eleven genera (*Salvia*, *Artemisia*, *Mentha*, *Geum*, *Ajuga*, *Teucrium*, *Plantago*, *Thymus*, *Potentilla*, *Lamium*, *Prunella*) are widely represented and distributed in study area. Among species with high frequency and abundance that can be harvested and valorized without damaging their natural populations are following: *Ajuga reptans*, *Mentha longifolia*, *Lamium purpureum*, *Salvia aethiopsis*, *S. nemorosa*, *Scutellaria altissima*, *Stachys annua*, *Potentilla reptans*, *Teucrium chamaedrys*, *Thymus marschallianus*, *Taraxacum officinalis* etc. Some of them (*Arctium lappa*, *Aristolochia clematitis*, *Artemisia annua*, *Capsella bursa-pastoris*, *Chelidonium majus*, *Cichorium intybus*, *Crataegus monogyna*, *Equisetum arvens*, *Fraxinus excelsior*, *Geum urbanum*, *Humulus lupulus*, *Lamium amplexicaule*, *L. purpureum*, *Matricaria recutita*, *Plantago lanceolata*, *Polygonum aviculare*, *Rosa canina*, *Sambucus nigra*, *Taraxacum officinale*, *Urtica dioica* etc.) showed wide distribution, frequently occurring as weeds around human settlements and considered as important medicinal plant resource for traditional use. There were 38 rare species revealed in the floristic composition, protected in Moldova at the national level, 29 species are included in the Red Book of Romania. Others 17 species are protected in Ukraine. Notable is the presence of four species threatened on European level and included in the European Red List of plants – *Angelica palustris*, *Koeleria moldavica*, *Lilium martagon* and *Schivereckia podolica*. Some rare and threatened therapeutically important species (*Asparagus officinalis*, *Astragalus glycyphyllos*, *Dryopteris filix-mas*, *Fragaria vesca*, *Galanthus nivalis*, *Helichrysum arenarium*, *Lilium martagon*, *Primula veris*, *Veratrum nigrum*) are cultivated in *ex-situ* conditions in the Botanical Garden (I) of ASM in order to protect them and to observe their reproductive behavior and accumulate experience on their agro technology. In table 1 the rare medicinal plants are given in alphabetical order, each with the indication of the list (or lists) which it is included as follows: Environmental Legislation of the Republic of Moldova – ELRM; The Red Book of the Republic of Moldova (2nd edition) – RBRM; Red Data Book of Ukraine – RDBU; Red Book of vascular plants of Romania – RBVPR; IUCN Red List Category (Europe) – IUCN-EU; The Annexes of the Habitats Directive – HD;

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) – BC; under The Convention on International Trade in Endangered Species of Wild Fauna and Flora – CITES; limit of natural distribution and therapeutic effects.

Table 1. *Threatened medicinal species in “Țâpova” reservation*

№	Latin name	Rare in Black Sea region				Rare on European level				Limit of natural distribution	Medicinal properties
		ELRM	RBRM	RDBU	RBVPR	IUCN-EU	HD	BC	CITES		
1.	<i>Amygdalus nana</i> L. (Rosaceae)	+									simulates respiration and improves digestion
2.	<i>Asparagus officinalis</i> L. (Asparagaceae)	+				+					antispasmodic, cardiac, diuretic, demulcent
3.	<i>Asparagus tenuifolius</i> Lam. (Asparagaceae)	+				+					young shoots used as vegetable
4.	<i>Asparagus verticillatus</i> L. (Asparagaceae)	+				+					young shoots used as vegetable
5.	<i>Asplenium ruta-muraria</i> L. (Aspleniaceae)	+									astringent, ophthalmic, emmenagogue
6.	<i>Asplenium trichomanes</i> L. (Aspleniaceae)	+									expectorant, laxative, emmenagogue
7.	<i>Astragalus glycyphyllos</i> L. (Fabaceae)									N	anti-asthmatic, cardiotonic
8.	<i>Carpinus betulus</i> L. (Betulaceae)									S-E	haemostatic, ophthalmic
9.	<i>Cystopteris fragilis</i> (L.) Bernh. (Athyriaceae)	+									anthelmintic
10.	<i>Dentaria bulbifera</i> L. (Brassicaceae)									S	nervous affections, epilepsy
11.	<i>Dryopteris filix-mas</i> (L.) Schott (Dryopteridaceae)	+								S	anti-inflammatory, anti-rheumatic, antiviral
12.	<i>Fragaria vesca</i> L. (Rosaceae)					+				S	antidiarrheal, astringent, diuretic, laxative
13.	<i>Fritillaria montana</i> Hoppe (Liliaceae)			+		+		+		N-E	source of alkaloids
14.	<i>Galanthus nivalis</i> L. (Amaryllidaceae)	+	+	+		+	+	+		N	emmenagogue
15.	<i>Helianthemum nummularium</i> (L.) Mill. (Cistaceae)									S	used in <i>Bach flower remedies</i> , ingredient in <i>Rescue</i> remedy
16.	<i>Helichrysum arenarium</i> (L.) Moench (Asteraceae)	+									cholagogue, diuretic, stomachic, skin
17.	<i>Lilium martagon</i> L. (Liliaceae)	+		+						S	cardiac, expectorant, diuretic, emollient,
18.	<i>Polygala sibirica</i> L. (Polygalaceae)	+			+						analgesic, expectorant, hemolytic, kidney
19.	<i>Populus tremula</i> L. (Salicaceae)									S	anti-inflammatory, febrifuge, stimulant
20.	<i>Primula veris</i> L. (Primulaceae)	+									anti-anxiety, sedative, antispasmodic
21.	<i>Scorzonera austriaca</i> Willd. (Asteraceae)	+		+							young leaves and roots used as a vegetable
22.	<i>Sorbus torminalis</i> (L.) Crantz (Rosaceae)	+		+						E	anti-rheumatic, hypoglycemic

23.	<i>Staphylea pinnata</i> L. (<i>Staphyleaceae</i>)	I V		+						S	seeds are edible
24.	<i>Veratrum nigrum</i> L. (<i>Melanthiaceae</i>)	II									analgesic, vermifuge, emetic, expectorant

Conclusions

Out of the total of 571 vascular plants, a number of 279 species have been documented for medicinal use with the most representative families: *Asteraceae* (44 sp.), *Lamiaceae* (25), *Rosaceae* (16), *Fabaceae* (16) and *Brassicaceae* (15 species). And only 85 of them, belonging to 36 families and 75 genera, are commonly used to treat different ailments. There were 38 rare species revealed in the floristic composition, protected in Moldova at the national level, 29 species are included in the Red Book of Romania and others 17 species are protected in Ukraine. Four species (*Angelica palustris*, *Koeleria moldavica*, *Lilium martagon*, *Schivereckia podolica*) are threatened on European level and included in the European Red List of plants. Nine rare and threatened medicinal species (*Asparagus officinalis*, *Astragalus glycyphyllos*, *Dryopteris filix-mas*, *Fragaria vesca*, *Galanthus nivalis*, *Helichrysum arenarium*, *Lilium martagon*, *Primula veris*, *Veratrum nigrum*) were included in *ex-situ* collections of the Botanical Garden (Institute) of ASM in order to preserve them and accumulate experience on their behavior in culture conditions.

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MOUNTAIN MODULIZATION PROCESS, AS BIOECONOMIC REVITALIZATION ELEMENT IN THE ROMANIAN CARPATHIANS

R. GRUIA¹

Abstract: *The paper proposes to describe a mechanism of systemic evolution of eco zone diversity from the Romanian Carpathians by applying the process of modulization, in relation both with the history past of Dacia terracing, and especially with the future of mountain economy. Based on the Theory of Eco emergent Integronics, the analyses is made in idea of the principles of the dynamics of modulization, which makes possible the achievement of modules through integronic and emergent restructure. In this context, in the study there is analyzed and described the mountain module, as a structural entity of complex and hyper complex systems of the mountain zone, itself representing the basic "cell" of the dynamics of systemic integration necessary in generating socio-economic viability. There are applied the principles of integronic management and of multifunctional agriculture and there is analyzed the manner and place in which the dynamics of eco emergent integronic manifests itself (synergic, synchronic, syncretic and emergent), so that it may result a series of solutions concerning the re-balance between mountain ecosystem components (forests, pastures, husbandry, water, rural space etc.). The module may be methodologically regarded as a territorial "bioreactor" (the analyses of raw materials, of processed products and of wastes), so that the new acquired modular systemic structure may be quantified, also eMergetically and respectively, there may be established the module typology and efficacy.*

Keywords: *bio-economy, Carpathian eco zones, emergence, integronics, mountain module, landscape management.*

1. Introduction

The concept of systemic evolution has been approached for a long time. For instance, in the *theory of dissipative structures* Ilya Prigogine (in the years after 1960) affirms that, for complex dynamic systems, disequilibrium represents the necessary condition for development (or system growth), i.e. systems far from balance. The phrase „far from equilibrium” is, in fact, the equivalent for non linearity. Dissipative structures spread their own energy in order to re-create themselves in new organization forms, in conditions of disorder and confrontation with amplification of noise level. These systems owe inner properties to reconfigure themselves so that they may exploit new information. Thus, open systems exchange energy, matter or information with their environments and, when pushed “far-from-equilibrium”, create new structures and a new order.

Aspects concerning systemic evolution are diversified through several directions, such as:

analyses of evolution modality of complex systems (linear or non linear evolution), analyses of emergent interrelations of the matter (Substance, Energy, Information), morphologic analyses of systemic substances (of the forms) through the study of complexity, analyses of functioning in dynamic equilibrium of complex systems (for example of ecosystems), respectively of control mechanisms (regulation and self regulation) etc., indicated references by Gruia (2002b), Gruia and Gaceu (2003).

Restructure dynamics may be approached in the bioeconomic model based on modulization process and indicates important elements of systemic evolution, with application at mountain complex systems. We remind in this direction the most important characteristics of a complex system, properties that are involved under a form or another in the process that we are speaking about: (a) a complex system is not a whole made of parts, but a whole made of other wholes; (b) then system components locally interact: any component does not directly react with all the

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others, but only with the neighboring ones; (c) the global behavior of the system is well defined and is independent from the component internal structure.

In this context it becomes possible the modulization dynamics of the mountain zones, the achieved "module" representing another whole that locally interact, independently of global behavior and, of course, well defined (well delimited, parameterized, monitored and controlled). The **complex system modulization theory** indicate references by Gruia (2010a) represents an assembly of hypothesis, laws and concepts, organized in a logic approach, which describe and explain the systemic process of *modulization* and its result, respectively of the system restructuration and resizing through emergent integration.

The modulization process has as work basis the *theory of eco emergent integronics*, indicate references by Gruia (2009a), which briefly applies the principle of emergent integration (synergic, synchronic, syncretic and emergent), in direct relation with eco-energetic analyses and concept (eMergetic). Here, the *emergy of* a form of energy defines available energy of a transformation or a system, indicate references by Pillet and Odum (1987), which constitutes one of the methodological principles of the theory applications. Starting from these theoretical aspects, the modulization process, through the *concept of emergent integronics* and, respectively the *principle of emergent integration*, approaches substance, energy and information (S,E,I) flows that cross systems from the perspective of the eco-energetic analyses, of cogeneration and eMergetic sustainability.

It is thus defined the model of restructuration (of change) and the type of functioning of the system modulization process, having as applications of interest especially the more difficult to analyze systems, namely complex systems and with dissipative structures, among which we mention ecosystems, agri-ecosystems and environment-economy systems, indicate references by Gruia (1998, 2002a), Szabo et al. (2005).

From what has been mentioned it is observed that the basic objective of this paper is linked to the elucidation of the *modulization process* applied to the mountain zones and to the understanding of the running directions, either at „macro” level, or at „micro” level, in relation with the type of modulized subsystem of the analyzed complex system, *module* resulting by

integronic restructuration and emergent integration, having the systemic evolution as a result.

In our opinion, as framework solutions, we consider two to be essential: on one hand, superior valorization of the mountain area through macro-modules, where maybe pedo climate and, implicitly, temperatures may become optimal for agriculture in the perspective of climate changes, and, on the other hand, agriculture in controlled environment and space of micro-modular type. For both variants, we are sure that the optimization of the activity will be linked to the *modulization process*.

2. Material and Method

The approached method proposes to apply the **theory of complex system modulization** in order to decipher systemic evolution, mainly aiming to elucidate the mechanisms of efficient "piloting" (integronic management) of subsystems or of the whole typologically restructured system as a "module". There are approached scientific and methodological aspects that sustain this approach: the emergence theory, the general theory of integration, the concept of ecologic modernization and others. The method puts into evidence "the modulization process", sustained by the concept of emergent integration and integronic restructuration, then it describes a series of aspects concerning ecologic emergency through systemic eco-modulization, based on the general theory of the integration of ecologic emergency or of eco emergent integronics. Methodologically, speaking about newly introduced terms/notions, indicate references by Gruia (2002, 2009), there is imposed a good understanding of the used notions: bioeconomics, modulization, integronic restructuring, macro-modulization, micro-modulization and others.

3. Results and Discussions

On the basis of complex system modulization mentioned before, it may be explained a model of the passing process towards superior forms of organization of complex and hyper complex systems form mountain zones, in order to put into evidence and holistically quantify new forms of organization, in the idea of optimally „piloting” the respective systems, indicate references by Gruia (1995,1998). The idea of link between the integration manners, of change of hierarchic structures and of new forms materializes itself by

the dualism „integration-emergency” indicate references by Bunge (1984), Constantinescu (1986) and others.

In essence there are three reference moments that contribute to the modulization process: (a) the *mechanism of flowing* (as for example energy flow on principles linked to Constructral law, indicate references by Bejan (2000), i.e. „*in order that a system may survive in time, its configuration must evolve so that it offers the best access for the currents that flow through it*“, (b) the *integration mechanism*, based on the general theory of integration and on the basis of the *principle of emergent integration*, i.e. in the situation when a system is also regulated from a functional point of view is organized, then the system is *integrated*; on the contrary, when the system functioning is disorganized, then the system is disintegrated and (c) the *restructuring mechanism*, respectively the approach from a new perspective of a module phenomena and processes, as well as the potentiality of the interrelations between the system elements, in order to put into evidence and quantify these new, superior phenomena of organization ”mountain modular unities”, i.e. simplified systems in detectable perimeters, with flows and monitored and controllable flows.

As it has been precised, the modulization process refers to the idea of ”passing” from a dimension into another one at systemic level, achieving, from bioeconomics i.e. *eco-economic perspective*, mountain modules by formation, restructuring and concentration, both from spatial point of view (material, substance) and energetic and informational one. The modulization dynamics is ascendingly put into evidence by organization, concentration and clearer and clearer delimitation of the area and perimeter of the given system, concomitantly with the related externalities, from material, ecologic, human and financial nature. It imposes thus the **modularization action**, respectively the action to modulize (itself) and its result, being in concordance with the idea of ”dimensioning” and ”redefining”. In the second step there is concretized the notion of ”**modulization**”, which represents the action of the structuring process and its result, respectively of resizing and emergent integration, through the flowing phenomenon, of integration and integronic restructuring of complex systems, with an ever better delimited perimetering, face to the initial non homogeneous estate similar to a complex and diffuse mosaic, having the growth in

concentration, in performances, in visibility and controllability towards a new quality of superior order as an effect.

Under this context it must be mentioned, within the modulization process, that there concomitantly increase both the quantity and the quality of information from the system, i.e. the complex system becomes better organized and, as a rule, more simplified, but more labile and dependent on energy. As it is known, **complexity** is defined as the number of „links” and interactions that may be established between system subunits, which may be also represented as the number of retroactions (feed-backs) that may be established between the mentioned elements. The modulization dynamics we are referring to has, through the concept, a reduced number of interactions and retroactions, when we refer to production fields of ecologic, biologic and technique, technique and economic nature, as for example are mountain modules or different types of ecosystems.

Therefore, the model of the modulization process may be better understood in its dynamics if we refer to ecosystems and to their ”eco-modulization”. The higher is the ecosystem anthropization degree, the more evidently manifests the modulization process. A prime effect is, for example, the restructuring concomitantly with the system *perimeter* delimitation and highlight, through emergent resizing and integration, indicate references by Gruia (2009b). On this idea, the mechanisms a complex or hyper complex mountain system goes through in the development of the modulization process have as a result the apparition of a perfectly controlled module, with high production capacity and in dynamic equilibrium, based on the mechanisms of eco emergent integronics in synergic, synchronic, syncretic and emergent connection. The starting point in defining the architecture of a mountain module too is represented by the basic situation and its characteristics given by the achievement of the diagnosis of the given system.

3.1. Synthetic data of diagnose of the mountain zone from Romania, as a landmark in the modulization process

Without entering into details, we consider it useful to stock take several data concerning the Carpathian Mountains, indicate references by Rey (2008), in order to have a starting landmark for the expected modulization process:

- **Relief** - fretful, with about 300 depressions; proportion of the mountain zone: 37,9 % (from the national territory)
Mountain surface: 90.240 km² (37,9% after NordRegio), 74.000 km² (32%) official delimitation Romania/2004.
- **Climate:** temperate-continental
- **Mountain population:** 3.600.000 inh. (15, 4%)
- **Human settlements:** 824 localities (744 communes, 80 towns and municipalities, with 3560 villages) and about 950.000 homestead (815.000 agric active).
- **Territorial fund:** 7.325.600 ha (about 2, 9 mil. ha agric and 4 mil. ha forestry vegetation – from which 1.280.000 ha natural pastures and 938.000 ha meadows). 53000 ha arable land; for a homestead, the average surface varies after the altitude: 2,5 ha at 600-700 m and 3,5-4,5 ha at over 800 m.
- **Husbandry:** Over 1,4 million inhabitants are animal breeders (about 40 % of the mountain population).
Cattle: 750.000 heads (2004).
Sheep: 1.998.000 heads
Face to 1990 – there are dramatic losses of effectives : about 35% at cattle and about 50% at sheep (with zones of 80%).
- **Management of mountain zone** has had during the last two decades more negative than positive aspects, which imposes to find solutions in order to *revitalize* this area.
Population income: from agriculture (30-40%), pluri activity and social assistance.

From what has been presented it is observed the complexity of the Carpathian Mountains, but also the possibility to imagine mountain modules of a large typological and functional variety, in order to increase the socio-economic attractiveness of the mountain zones. But in order to fix certain principles of the approach, a series of specifications is necessary.

As a historic evolution, it is known the fact that, until 1990, mountain agriculture had been marginalized from political reasons (being a non collectivized zone). In fact, the homesteads hadn't been modernized (stables, mechanization and others); mountain husbandry was, as a rule, practiced with mediocre animal races, the teaching system had remained misfit and scientific research almost absent. After the year 1990 there has begun excessive exploitation of the forests and mining (which had been

substantially reduced), mineral waters, small industries, handicraft, tourism and services outline mountain economy. There have been registered massive losses of jobs after 1990, which represents a cause of the migration of the labor force in different European countries. Sanitary assistance and teaching system are assured – at a general level. Rural mountain teaching system is not adapted at the specificity of the mountain agri-environment. Without exaggerating, one may speak about a *demographic catastrophe* of the mountain zones in Romania.

Among the **causes** that impose revitalization by mouldulization processes, for the increase of the mountain zone attractiveness, one may remind the fact that, after the year 2000, it is registered the exodus of the mountain rural youth and agricultural abandon, in an alarming growth, and certain previewed measures after the adherence at the EU are a lot insufficient to stop or attenuate the installed demographic erosion. The result is the non profitability, derisory prices for milk and meat, under monopole conditions. The deviation from the economy of animal breeding in the immediate damage of forest, and, on the other hand, excessive forest cut (for a rapid profit or lack of alternatives for existence) have led to large flooding, landslides, accentuations of climate changes, dramatic reductions of cattle and sheep effectives and others.

Pursuant to these causes there may be synthesized a series of consequences upon the environment: -contribution in pronounced loss of organic fertilizers from ruminants; -alarming qualitative degradations of the pasture and grassland flora with high fodder value; -grievous impairment of high social utility biodiversity; -invasion of plants without fodder value. Exaggerations in the name of biodiversity by protecting certain plants – as *Nardus* species, forest moss, fern and others; - excessive multiplication of certain wild animals that produce damage in agriculture and mountain husbandry: bears, wolves, wild boars.

As a gratifying aspect, after the year 1990 and especially after the year 2000, mountain tourism and agro tourism have been in positive evolution, but it is worrying the fact that agricultural and cultural traditions, significant though in the mountain zone, are in pronounced degradation and alienation from authenticity.

Concerning the *energetic* and *industrial field* from the mountain zone, the impact upon the

environment is considerable. Industry needs raw materials, from where the construction of certain transportation network (railway, highway, underground or air, pipes for oil or natural gases, electric cables etc.).

Supported thus in its development, industry has territorially expanded, independently from energetic sources or from those of raw materials, bringing on huge transformations in the geographic scene of the mountain area, so that: - mining brings big modifications of the scene, and digging galleries may cause landfall that seem to be incisions in land; - depositions of blank that stand in the proximity of mines often bring significant modifications to the scene, these ones taking hill dimensions; - mines in the open (in quarries), with stripping of nonproductive above strata, which may become tens of meters thick, radically change the aspect of places, destroying first the fertile soil; - modern industry is the result of a radical transformation of old crafts industry, boosted by mechanization, by new energetic sources; - geographic scenery changes are due to the fact that almost all industrial branches consume much water, from where the necessity of adduction through pipes or of creation of new large reservoirs nearby; - hydropower waterfalls that turn the water power into energy, modify sceneries and influence ecosystems; - development of new general activities of man with consequences that in

different manners affect the most varied ecosystems (deforestations, illegal hunting and fishing etc), which also lead to scenery and expected mountain modules modification.

Under this context it imposes to find solutions in order to *bioeconomically revitalize the mountain zone* from Romania, a model being linked to the modulization of this area.

3.2. Dynamics of mountain ecosystemic and eco-economic modulization

The change of mountain sceneries and ecosystems becomes inevitable if there is pursued the increase of socio-economic attractiveness. But it is very important the way how these changes are made, i.e. with an ever more reduced impact or even without destroying the natural environment and all its components.

Mountain modules we are describing are essentially structural elements of mountain ecosystems, as a kind of „cell with different functional typologies and specializations in an organism“, i.e. modules in a whole represented by the mountain zone (fig.1).

Without entering into details, we specify an application of the modulization process, namely in case of environment-economy systems specific to the mountain zone. Anthropogenic ecosystems have a simplified structure, with increased energetic support in order to maintain

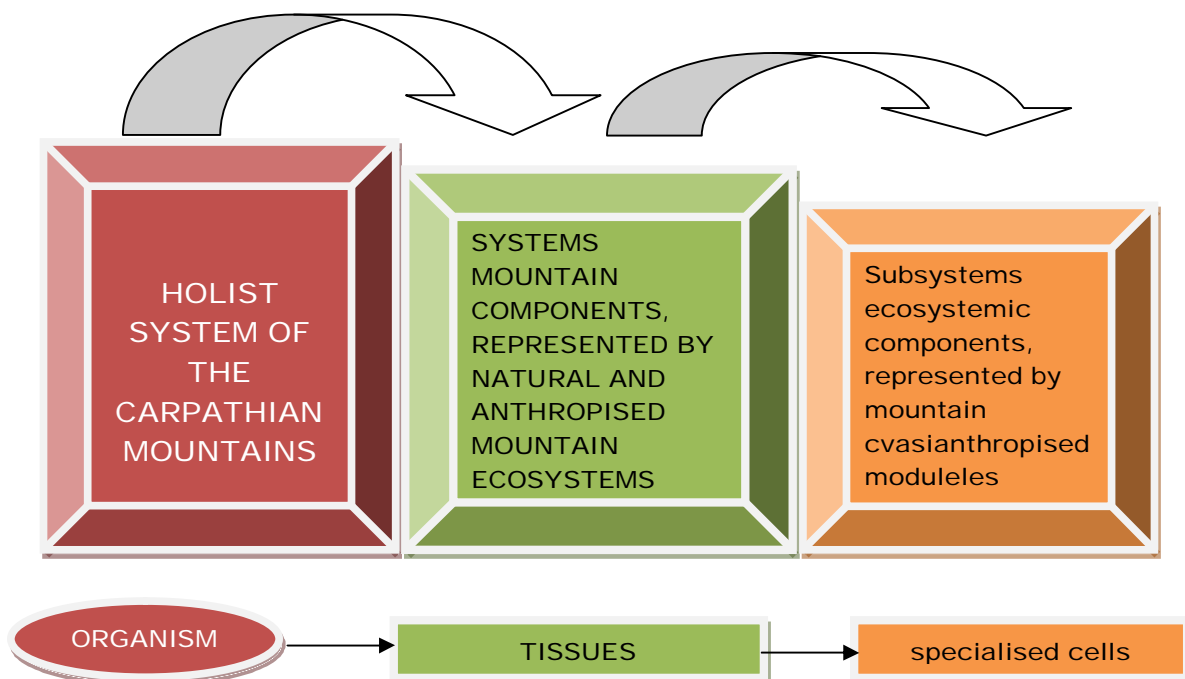


Fig.1. Place of mountain modules ("specialized cells") in the structures of the Carnathian Mountains

equilibrium under the conditions of achieving the objective for which they have been created, i.e. a high productivity, indicate references by Gaceu and Gruia (2003) i.e. Though they structurally differ, man, by profoundly knowing natural ecosystems, he may permanently improve the structure of his own ecosystems through modules he imagines.

Thus an eloquent example is represented by *modular agriculture*, indicate references by Gruia (2010b), i.e. agro-ecosystem modulization and, more precisely, of their economic expression, respectively of the eco-farms, of the unities of non destructive alimentary processing or of trade of agro-alimentary bio-eco-products, restructuration with high potential for the agro-alimentary eco-economic system of the decades to come.

Otherwise said, it results that integronic restructuring is a process whose dynamics differently evolves in function of the **modulization level** or **degree**.

This aspect becomes more evident in case of mountain ecosystems and of related agro ecosystems, having an eco-economic support. We are first referring to the level of large agro ecosystems, concretized by *eco-farms* as well as large production agro-modules, with not very well shaped perimeter; indicate references by Gruia (1998). Then we refer to the modulization of certain "mini-ecosystems" of the type of certain relatively small *agri-modules*, with well shaped perimeter, being in fact question about production modules in totally controlled by man space and environment, aspects widely described by the model of modular agriculture.

From what has been specified it results the eco-economic importance of the mountain modulization process in the dynamics of complex systems, as well as the fact that this process constitutes in itself a necessary instrument in the management of Manmade ecosystems, especially on the principles of integronic management, i.e. in harmonious piloting of all components, having as a result their effective management.

The generic awareness of the modulization process means an important step for the productive activity in the future, especially if we take into account climate, ecologic, economic and social provocations, i.e. the transition from the green economy to the blue economy, by obtaining mountain eco-bio-products, as an expression of the eco-economy specific to the sustainable development of the 21st century.

3.3. Mountain modules

The mountain landscape, formed of specific ecosystems, is the environment that differs through an own grouping of component elements (relief, climate, waters, soil, vegetation, fauna etc.) and which, together with *anthropogenic elements* compile the **mountain module**.

THE MOUNTAIN MODULE constitutes and combines structural elements of the mountain ecosystem in dynamic equilibrium, or those of an environment-economy system, a bioeconomy with harmonious contribution, with ecologic and economic efficacy between its components represented by forests, pastures, husbandry, agricultural cultures, water, small production and service sphere, rural space and local community.

At the conceptualization of mountain modules, the element that influences the scenery aspect is represented by the relief, though vegetation or human habitations have a more visible character. That is why we will analyze mountain modules in function of altitude gradient.

In order to achieve mountain modules, man uses a series of methods and techniques: of production, of organization, of orientation, of education etc. In order to correctly understand human relations (therefore also with agriculture, with ecologic tourism, with plants, with animals, etc), it is very important that people get an adequate, solid and multilateral education.

The mountain area becomes a strategic provocation for the next decades. In the year 2000, The European Union decided, through the Lisbon strategy, to make the old continent become the most competitive and dynamic economy of the world, taking into account the globalization process. In this global strategy, it is certain that the **mountain**, with its specific agriculture and alimentation, with the zone attractiveness through tourism, little industry, biodiversity, cultural and spiritual elements, should have a privileged place. It is previewed that in about four decades there will be doubled the world demand of food and water, under the conditions of climate and socio-politic changes. That is why there must be found an *eco-bio-geo-economic model* capable to bring its contribution to problem solving. The model we are describing enters on this direction, the mountain probably being one of the world salvation reserves. In this direction, for Romania, the Carpathian Mountains should be the priority. If for the authorities the idea is to be discussed, for the specialists it is

about a big provocation. That is why the mountain zone modulization becomes opportune.

Therefore, the model will have to cover all activities possible to go on in mountain zones and to respond to a series of large objectives (table 1).

Table 1. *Frame objectives for the mountain models*

Crt.	MAJOR OBJECTIVES	SPECIFICATION
1	Assurance of mountain zone attractiveness	Mountain modules will have to contain, in different combinations, the agro-husbandry production, food processing, culinary production, mountain tourism and leisure, small industry and natural richness valorization (ex. hydro energy), specific transportation and telecommunications, education, culture, health system, environment protection etc.
2	Assurance of alimentary security of human population from mountain zones	Agriculturalists, as applicants of the new modular model, will have to emphasize both provocation concerning quantity, assuring providing regularity with a large scale of mountain products, and quality, guarantying consumers to respect sanitary traceability and security norms.
3	Integration of the model in national and worldwide market, taking into account the competition of the big mountain world powers	Mountain modules from the Carpathians will have to sustain originality and tradition in the ever fiercer competition. For instance mountain agriculture and gastronomy, developing their competitiveness, must be able to cover more and more alimentary needs of the tourist chain.
4	Contribution of the model to the struggle against climate changes and to the environment improvement	Climate changes induce the idea of deforestation of large zones where the climate is very hot, with an ever more intense recovery of the regions at the 45 parallel and, at the same time, at medium towards high altitude. There become important the modules of the hill, plateau, pre mountain and mountain zone, from the Carpathians, with ambitious objectives in order to find solutions to counter the climate heating. It is taken into account to preserve natural resources as a condition of the perennial of the mountain zone attractiveness.
5	Participation at territorial arrangement	The new bioeconomic and socio-economic models of the mountain zone, especially with agricultural modules integrated in the scenery and territorial management, must contribute to keep jobs at local level, as well as to maintain economic activity in isolated geographic zones (as for example the high and alpine mountain ones).

Taking into account that agriculturer-entrepreneurs live from their work and the needs of the world market show that this is possible, it is necessary that new models sustain and be capable of certain necessary interventions. We are referring to a series of actual aspects which must be taken into account, namely structural difficulties of the sheep breeding sector, milk in difficult zones and mountain agriculture. A basic example in the modulization of high altitude zones is represented by the **mountain agri-module**, because it becomes efficient to understand the development of agriculture and alimentation on *production modules*.

3.4. Mountain agri-modules

The **mountain agri-module** represents the conventional measure unit for the determination

of the proportions of a complex bioeconomic system of *mountain environment-agriculture-alimentation* type or of high altitude *agroecosystems* type and which assure the execution of their production function in dynamic equilibrium, through own structure and regulation and self regulation mechanisms.

We consider that, for the mountain agri-module, the offered models of **sustainable agriculture** represent „the launching ramp” in an evolution of the mountain agriculture. These modules will in principle aim to eliminate the actual imbalances and to achieve an agreement between environment and economy, between the activity developed by man in the agri-food field and the sustaining of this technical-economic activity by the natural surrounding environment through the so-called „externalities” (goods and services of the environment „labor”), indicate

references by Hall et al. (1995), Matsuda and Kuboca (1983), Odum (1983), Pillet and Odum (1987).

Eco-emergent integronics, at conceptual bioeconomic level, leads towards understanding certain totally new forms of agriculture, such as *modular agriculture model* are, indicate

references by Gruia (2010b). Thus, there may be imagined mountain agri-modules of different types (table 2), including as complex systems of food production, having as entrance data in the system, dynamic conditions of climate and demographic change expected for the decades to come.

Table 2. *Classification elements of mountain agri-modules*

Crt.	CRITERION	CLASSIFICATION	OBS.
1	After altitude	Mountain modules at medium altitude	500-1600 m
		Mountain modules at high altitude	1600-2500 m
2	After the control degree	Uncontrolled mountain modules	- practically classic mountain agro ecosystems, depending on natural climate and on bad weather (cow eco-farms, sheep farms and related sheepfolds etc.)
		Semi-controlled mountain modules	- systems that presuppose the presence of earth and soil biocenoses in spaces of greenhouse type, solariums, production halls
		Totally controlled mountain modules	- agro-modules from high or alpine mountain zones without practicable land, but with water, energy (especially electric) and culture environment dependence - modules of energetic and industrial type
3	After the production type	Mountain agri-modules	- of vegetal production and/or of mushroom production, especially from horticulture field - of animal production, regularly with species of small animals, poultry, pigs, other species in the future as well -of mixed production, as for example: vegetal, husbandry, fish, plus food processing
		Industrial mountain modules	- of alimentary industry - of energetic industry - of raw material industry
4	After the module size	Mountain micro-modules	- with potentiality to develop and transform peasant households in micro-enterprises
		Medium mountain modules	- important economic level, regularly through integration on horizontal
		Mountain macro-modules	- large efficiency and efficacy, on wide natural areas, with good production conditions, regularly through horizontal and vertical integration (primary agro-husbandry production, energetic, industrial and processing production, marketing)

From the typological multitude of the mountain modules presented in the above table, we will exemplify in figure 2 an industrial mountain module on the direction of food

processing indicate references by Rey (2011), that may represent a model for different sub regions or mountain eco-zones.

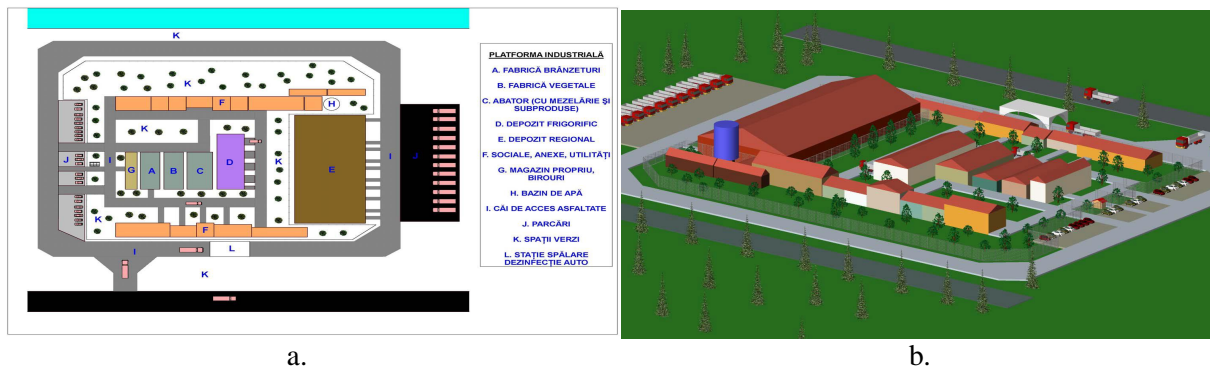


Fig.2. Mountain module model industrial associative platform for eco-bio-mountain products type

- a.** principle scheme: A – cheese factory; B – vegetal processing factory; C – slaughterhouse and meat processing; D –refrigerant storehouse; E – regional storehouse; F - annexes, social, utilities; G – shops and offices; H – Water pools; I – ways of access; J - parking; K – green spaces; L – washing station and auto disinfection;
- b.** model - overview.

In principle the mountain modules will have to be complex systems of the mountain micro-module type, energetically autonomous on solar and wind basis, capable or recycle rain and used water, to transform waste and manure in natural fertilizers, to organize a culture rotation in order to allow earth regenerate without chemical fertilizers. Also there must be imagined agro husbandry technologies on short circuits, with a

maximal simplification of the system of agricultural machinery, of means of transportation, rethink sanitary systems etc. It is also essential the GIS integration indicate references by Krause et al. (2005) and applications of IT modular development, and as an example may be given the principle scheme from figure 3 indicate references by Reynolds and Acock (1997), Porter et al. (1999).

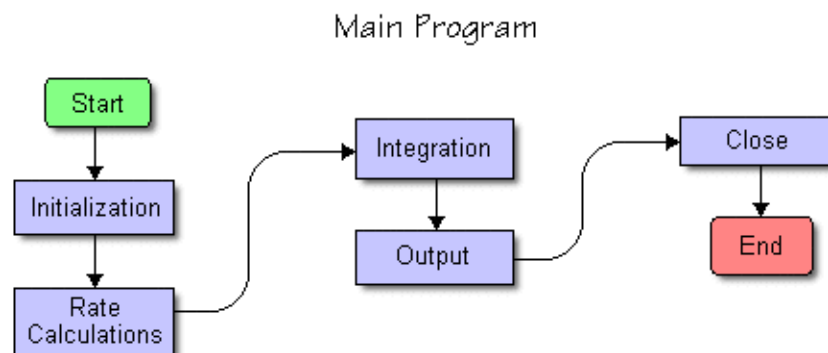


Fig.3. Schematic of an overview of the modular structure

Stipulated modules will put into value the mountain agri-food potential taking into account a series of **pragmatic conditions**: - *SEPARATION* from other products, from non mountain zones; - *ORGANIZATION* of producers in valorization associations, with own capacities of transformation and marketing; - correct, motivating *PRICES*, for milk and meat – raw material; - *PROMOTION* “local brand” at the level of mountain pools for eco-bio-mountain products; - technologic *REORIENTATION* that

may be brought to the mountain zone and farm modernization – with accent on animal and product hygiene; - *DEVELOPMENT* of positive externalities and of montanology technique, economic, sociologic research and specialist formation; - *LEGISLATION* by protective legal support and specific organization for agro-husbandry economy and mountain environment; - agro-forest constant dynamic *EQUILIBRIUM* and benefic cooperation of both fields.

3.5. *Integrative management of mountain modules*

The Earth could feed only 1,5 billion people, i.e. only 25% from all the planet inhabitants! In this context, to approach issues referring to “the share of natural in the economy” and, implicitly, of ecosystem *piloting*, especially of **integrative management** indicate references by Gruia (2006) with applications in agro-ecosystems case or in the eco-farms one are of a stringent actuality.

Mountain modules mostly apply the management of principle of the green economy, which presupposes creation and modification of public policies and settlements necessary to sustain initiatives and affairs oriented towards the reduction of pollutant emissions in the environment. In spite of the progress registered in this field, we begin to be aware that **Green Economy** is only a step in the direction of the transformation of social-economic development paradigms. This new paradigm is the **Blue Economy**, indicate references by Pauli (2009).

Integrated sustainable management applied to the new paradigm makes affairs that function on the principles of Blue Economy render possible the covering of everybody basic needs, but without non rationally exploiting natural resources and, at the same time, under conditions not to give up a certain living standard and modern services. The Blue Economy model is the one of **circular economy** that leads to efficiency and efficacy, based on the principle that says that “Blue Economy favors the transition from an economy based on the product to an economy based on the system”.

If management has represented the basic activity for economic explosion specific to postindustrial society, understanding a long term equilibrium of the transition towards „metabolic” society (biologic-informational) based on green economy converted towards Blue Economy can be guaranteed only by a **new model**, that we have been promoting for a certain time, namely the **management integrative** one indicate references by Gruia (2013). This approach is applied in the bioeconomic context of the idea that structural levels take into account, in different integration degrees S, E and I in piloting complex systems, in a process in synchronic and syncretic dynamics, in essence based on emergent and synergic integration. Thus, the management of the mountain module cannot and must not be reduced to substance (S) or matters, but will have to be reconsidered in being more comprehensive,

by more evident opening towards energy (E) and information (I), indicate references by Soran and Șerban (1988), Stancovici (1983), Witcomb (1972). Piloting in this case will not be only economically more efficient, but will become effective in relation with the system, indicate references by Ayres and Kneese (1969), Constantinescu (1986), Gruia (2000, 2001), Gruia and Păstărnac (1991). Thus, the first step is made towards understanding the *production modules* as complex systems, including mountain agri-modules of ”mini-ecosystem” type of food production in controlled environment and space, when in mountain environment appear major pedo climate modifications.

As targets of the integrative management applied at mountain modules we remark the functioning direction on principles of sustainable development and of the environment protection, on the basis of reprojecting technologies and integrated politics. The module may be methodologically regarded as a territorial ”bioreactor” (the analyses of raw materials, of processed products and of wastes), so that the modular systemic structure newly acquired to be quantified, including energetic and, respectively, to be typologically established and module efficacy. In this direction it may be underlined the role of the environment labor in economic processes and to take it into consideration in management together with human labor, when in parameterization the mountain module energetic *parameters* are used that synthesize the real economic process and the sustainability of complex systems indicate references by Gruia (2001), as a basis of the strategy of the integrative management. Among these parameters we mention: the degree of energy concentration, the monergy, the macro-price of energetic externalities, real labor, systemic efficacy, sustainability coefficient and others. The coordination of all theoretic elements and of practical aspects in the expected module may trigger the **emergent integration** necessary to the passing to a superior level of organization, to a management which has as a result the increase of the eco-bioproduct (alimentary and non-alimentary) quality from the mountain zone.

Conclusions

The generic awareness of the modulization process means an important step for the productive activity in the future, especially if we take into account climate, ecologic, economic

and social provocations, i.e. the additional transition from Green economy to Blue economy, with the obtaining of alimentary and non-alimentary mountain eco-bio-products, as an bioeconomic expression of the eco-economy specific to the sustainable development of the 21st century.

The mountain module represents structural components of mountain ecosystems in dynamic equilibrium, or of the Environment-Economy Systems, with harmonious relation, with ecologic efficacy and economic efficiency between its elements formed by forests, pastures, husbandry, agricultural cultures, water, small production and service sphere, rural space and local community and others, as a sort of "cells with functional specializations", i.e. modules in a whole represented by the mountain zone.

The bioeconomic level i.e. technologic and socio-economic model of the mountain modules has in view the fact that there are complex systems with different typology, energetically autonomous (including on solar and wind basis), capable to recycle rain and used water, to transform waste and manure in natural fertilizers, to organize culture rotation in order to allow earth to regenerate without chemical fertilizers; also it must be imagined industrial or agri-husbandry technologies on short circuits, with maximal simplification of agricultural machine system, of the means of transportation, but also to rethink sanitary systems, GIS integration and utilization of the applications of IT modular development.

The mountain module may be regarded from bioeconomical point of view, as a territorial "bioreactor" (analyses of raw materials, of processed products and of wastes), so that newly acquired modular systemic structure be quantified, including energetically and, respectively, be established module typology and efficacy, which may underline the role of environment labor in economic processes and to take it into consideration in management together with human labor and in quantification through *emergetic parameters*: degrees of concentration of energy, monergy, energetic externality macro-price, real labor, systemic efficacy, sustainability coefficient and others.

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DEVELOPMENT OF INNOVATIVE BIODEGRADABLE PACKAGING SYSTEM TO IMPROVE SHELF LIFE, QUALITY AND SAFETY OF FRESH PRODUCTS

L. MOLDOVAN¹, G. PANTEA²

Abstract: Currently smart packaging technology depends on package based indicators. Recent developments in 'Thermomorphic adhesives' could be utilized in the development of package based indicators that utilize the third dimension and addition of a feedback system, improve the traceability of packed products.

At present current package based feedback systems send information back to the computer terminal, for example state of the art in relation to this type of technology is a temperature profile recorder that can be analyzed on a computer terminal. A possible evolutionary method from this current state may involve a sensor mechanism that identifies a long time/temp lag or in a batch, or in the room it is being stored in. The new RFDI technologies enable modern labeling systems for food packaging. Active and intelligent packaging have many advantages than the common used methods:

- Reduce product wastage, monitor atmosphere, temperature or food inside a pack. Nanotechnology using different means of indicators like varnish or coatings for plastics materials to indicate time, temperature inside the package.
- Active and intelligent packaging is often applied using existing techniques: labeling or pick & place. New products, such as nano-coatings, anti-microbial solutions, tags for all kinds of applications and particularly printed electronics will require new equipments functionalities.

Sustainability of the new packaging methods consists in:

- Extended shelf life of the packed product;
- Improvements of the equipment for the food packaging;
- Guaranteeing packaging quality and a better preservation of the product.

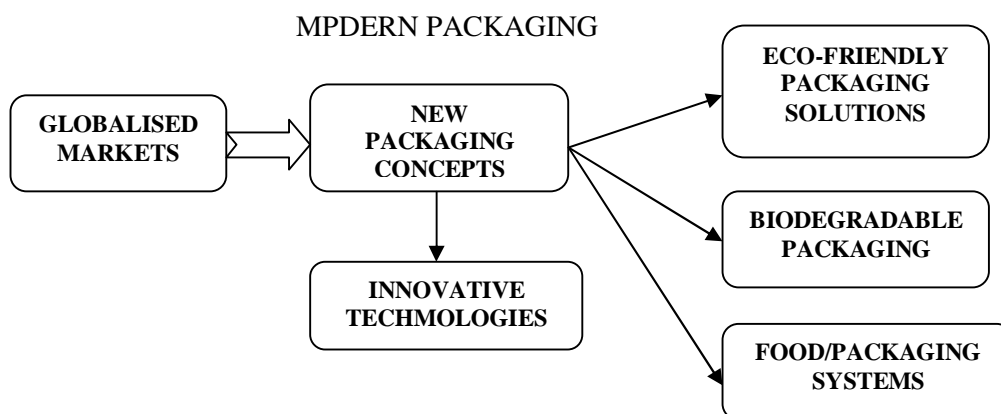
Product presentation and information are key factors, brands are mostly defined by their packaging methods.

Keywords: active packaging, food safety, food traceability, intelligent packaging

1. Importance of packaging in improving shelf life of the products

Packaging plays a vital role in any modern integrated product supply system. It does not only protect product integrity and properties from

the production line to the consumer: impact on health and safety), but also facilitates production, distribution and storage. Packaging technology is currently making huge strides in the development and application of new products and processes.



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Packaging is an integral part of food processing and preservation and influence the product shelf-life. The packaging material can affect the product by physical and chemical modifications because of the particles migration into the aliments.

In the case of the food, it is essential to maintain the quality and safety of the food during the transportation and storage, and extend the shelf-life of the product. The container is the responsible for protecting the food from the medium, preserving it from physical, chemical and microbiological factors such as: oxygen, moisture, light or microbial contamination that could affect the quality of the product.

The modern packaging equipments enable realization of different types of packaging, ensuring the main characteristics needed by the food packaging sector:

- Collective packaging (more products in a single pack);
- Portioned packaging (a single use pack);
- Packaging in recipient;
- Aerosol packaging (under pressure packaging);
- Vacuum packaging;
- Packaging in controlled atmosphere (the material is impermeable to gases);
- Modified atmosphere packaging (use of N₂, CO₂, O₂ to realize the modified atmosphere, the protective gas is in accordance with the packed product);
- Skin packaging (food products like cheese, meat, etc);
- Aseptic packaging (a sterilized product is introduced in a sterilized package);
- Contractible films packaging (skin packaging is obtained under vacuum and its aim is to realize permeability to oxygen);
- Extensible films (there are similar to contractible films without using tunnels);

In selecting the packaging material there are taken in consideration the materials characteristics and its made an analyze of their importance.

Factors in selecting packaging materials

In selecting the packaging materials there are many factors which influence this decision, product sensibility;

- ❖ The characteristics of the packed product: nature, size, mass, etc;

- ❖ The transportation and the storage conditions;
- ❖ The packaging method;
- ❖ The market factors: distribution time, package size, cost;
- ❖ The economic factors: cost of the product, biodegradability, recyclability.

One of the most important packaging method is the **intelligent packaging**, which offers many advantages: improve food safety, extends shelf life of the products, freshness indicator, communicate with the consumers using different indicators for temperature, duration of storage, etc.).

Active Packaging: incorporates components that wood release or absorb substances into or from the packed food or the environment surrounding the food.

Intelligent Packaging: monitor the condition of packaged food or the environment surrounding the food (regulation (EC) No 1935/2004).

Active and intelligent packaging (Smart Packaging)

- Brand owners keep to protect their brands & reduce product wastage, have explored 'intelligent or active' packaging. Smart labels, for instance to monitor atmosphere, temperature or food inside a pack. Next stage is nano technology with ink or coatings for plastics materials. RFID Tags & inks are another way brand owners "protect" their products in store;

- Active and intelligent packaging is often applied using existing techniques (Egg: labeling or pick & place). According to Active & Intelligent Packaging Association, new products, such as nano-coatings, anti-microbial solutions, tags for all kinds of applications and particularly printed electronics will require new machine functionalities.

The intelligent packaging method use: freshness indicators, spoilage indicators, tampering indicators, temperature and time indicators.

Increasing use of senses in intelligent packaging

Currently existing smart packaging technology depends on sight based indicators. This precludes any benefit to blind, visually or mentally impaired individuals. Recent developments in 'Thermomorphic adhesives' could be utilized in the development of package based indicators that utilize the third dimension and the sense of touch. In a different developmental direction and linking in with the addition of feedback, potential exists

for numerous consumer packaging feedback products.



At present current package based feedback systems send information back to the computer terminal, for example state of the art in relation to this type of technology is a temperature profile recorder that can be analyzed on a computer terminal. A possible evolutionary jump from this current state may involve a sensor mechanism that identifies a long time/temp lag and activates a cooling device either in the pack, or in a batch, or in the room it is being stored in.

Sustainability

- Good business sense - using less energy, raw materials, water etc. goes straight to the bottom line, still key as food manufacturers try to meet their Courtauld commitments (UK) & corporate sustainability & responsibility targets
- Most quick wins already made, future gains often small incremental improvements to machinery in the future
- Guaranteeing packaging quality & minimizing costly re-work is particularly critical.
 - Packaging is the 'enabler' for shopping as we know it today – supermarkets could not exist without it
 - Product wastage in the supply chain is now minimal
 - Product presentation and information are key
 - Brands are mostly defined by their Packaging system
 - Many markets owe their existence to developments in packaging

2. Factors influencing the packaging quality european legislation regarding packaging

Food contact legislation for the packaging material or for separate components of composite packaging material: EU Directive 89/109/EEC regarding "materials which come into contact with foodstuffs", EC 10/2011, CEN standards related to the essential requirements are:

Controllability

EN13427, EN13428, EN13429, EN13430, EN13431, EN13432,

PACKAGE DESIGN. Sustainable methods for food packaging

Changing and more complex lifestyles have also strongly influenced packaging design. Pre-cut, pre-portioned, smaller, ready to consume products are increasingly popular, reflecting the importance of convenience to today's customers. Blister packs, microwaveable packs, zippered pouches, contoured shapes and carry handles on outer packs are just some examples of this trend.

Logistics: Key logistics changes to the packaging industry will see increased customer choice, faster product delivery, increased manufacturing and inventory controls and increased supply chain management efficiency. In the very near future many packaging customers will have online access to their suppliers manufacturing logistics systems, as we will to theirs.

This will enable relatively seamless progress from initiation of product requirement, through to order placement, manufacturing, delivery, invoicing and distribution.

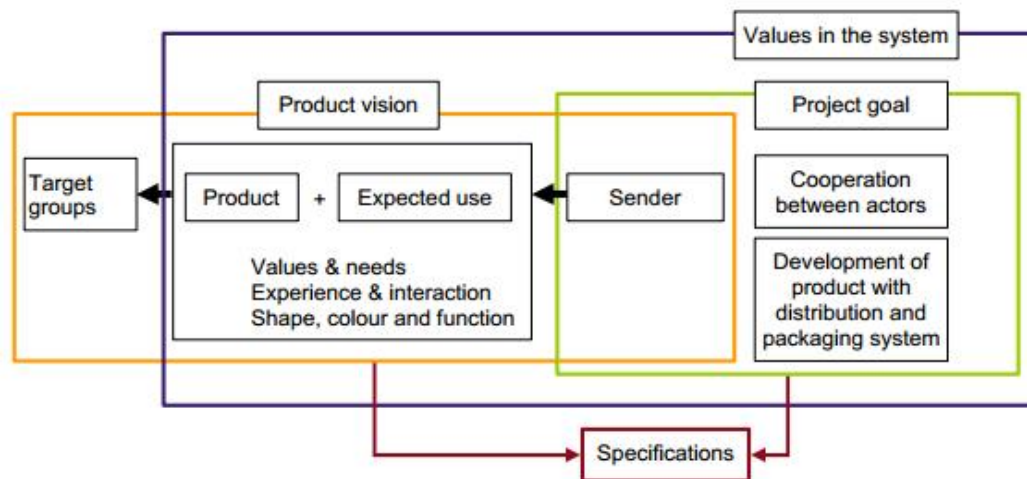
New technology: Smarter packaging companies around the world are already using new technology to take costs out of their own systems. And they're using Internet links to improve their relationships and performance with customers.

And it's in our type of industry—business to business—that will see the biggest impact of computer technology and e-commerce. It's those packaging companies who don't get proactive about their Internet strategies who will find themselves being passed over by their customers.

The preliminary model is an attempt of linking existing models in product design and development together.

The right side is the issues related to the value chain; where the product is produced and distributed, the packaging/product is developed in cooperation, and the sender of the product. On

the left side the need of the end user and the commercial communication are integrated.



Product design in accordance with the environment protection (eco-design). Eco-design is an approach to design of a product with special consideration for the environmental impacts of the product during its whole lifecycle.

Package design with extruded materials

In the manufacture of conventional packages, the need of adequate gas and vapor barrier, mechanical strength, seal ability, printing, etc. is resolved by designing multilayer structures. In active packaging, the release of the agent can be controlled by a suitable design of the packaging structure. This design is dependent on the type of agent, the type of polymer matrix, but overall, on the packaging requirements of the food product.

When the active extruded film presents adequate antimicrobial activity and provides the rest of packaging requirements of the packaged product, the active packaging system may be constituted by a monolayer film of the active material but this is not the general case. If the active agent is toxic as occurs with some active systems, it cannot be in direct contact with food or be released into food.

The package design must include a functional or protective layer to limit the migration of potentially hazardous compounds. When the agent is volatile, it can be released into the environment resulting in a loss of agent and a reduction of activity. The lamination or co extrusion of the active layer to a structural mono or multilayer film can solved the packaging design.

In all active systems based on the release of the agent, the activity of this system is controlled by the extent of the agent released to the food and to the internal and external atmospheres, which is

characterized by the partition equilibrium of the agent in the diverse components of the food/package/environment system and by the diffusion rate of the agent in the diverse polymeric matrices.

The exchange of the agent within such a complex system is very difficult to determine experimentally and the use of mathematical models based on numerical approximations such as the finite difference or finite element methods can provide predictions on the release behavior of such complex structure and help in the design optimization.

3. Environmental Impacts

Choice of packaging type is made on the basis of a series of trade -offs between many factors, particularly between the amount of packaging and likely product wastage.

Nowadays the utilization of the eco-efficient materials are on the first plane for the most producers of packaging materials. The importance of the **biodegradable materials** are underlined in the following paragraph:

- a) The modern packaging implies the usage of the biodegradable materials for the packaging which have a positive impact on the environment;
- b) The packaging materials from the new generation enable the grow of the shelf life of the food at the retailers and also enable the usage of the packaging methods which implies the traceability in the food chain;
- c) The new generation of food packaging materials ensures the grow of the quality and of the food safety and also the consumers trust;

d) The recycle of the packaging materials it is an important issue for all packaging materials manufactures for a better utilization of the bio-mass resources;

Does the package thickness matter?

Packaging materials differ in thickness. The thinner the packaging material, the less landfill space it will take up. Thin plastics can be very strong. Some manufacturers have addressed the packaging dilemma by switching to strong, thin materials for wrapping such items as disposable diapers and dinner napkins. However, the use of thinner plastics in food packaging can reduce safety and protection from contaminants, punctures, and tampering.

Plastic food containers cannot be recycled to make new food containers for sanitation reasons.

For biodegradable plastic there are made researches at national and international level to analyze the different compositions, compostable materials being made from different resources: bio-materials with biodegradable polymers, adding additives to improve different properties needed in the packaging process: seal ability, fat resistance, strength to exterior factors, drop resistance, etc.

Many of the European projects are dealing with improving the characteristics of the new packaging materials to extend the shelf life of the packed product, to enable a larger products to be used with these materials. These biodegradable materials needs to have the same main characteristics as the classical ones, not to modified the properties of the packed product.

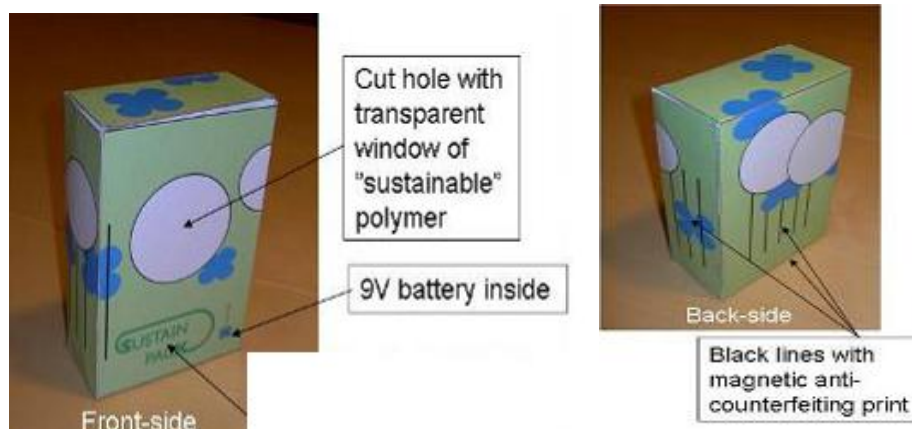
Category	European legislation	National legislation
Legislative	2008/98/EC directive 2006/12/EEC	HG 1470/2004; HG 358/2007; Law 27/2007
Waste storage	Directive 1999/EC; Directive 2006/12/EC	HG 349/2005; HG 210/2007 Law 426/2001
Package waste	Directive 94/62/EC	HG 621/2005; HG 247/2011
Electric waste	Directive 2002/96/EC	HG 1037/2010

4. Traceability of Products on the Food Chain

One of the most discussed theme is the traceability of the packed products, being developed new methods to assure it on the

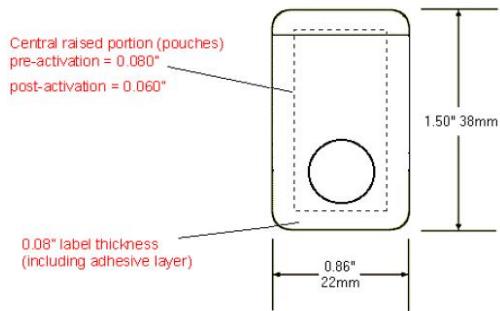
entire alimentary chain, from manufacturer to different market suppliers.

In the new technologies there are used electronic systems that can be attached to the package indicating different characteristics like temperature, time of storage, duration of delivery, etc. (www.sustainpack.eu).



Single dot Vitsab's CheckPoint™ brand
labels: (1) distribution temperature

monitoring of cartons or pallets of product, and (2) distribution or consumer package unit.



(Packaging/Brody, Inc.)



(NAFISPACK project)

These new systems includes complicated software design, an example is TRACKSOFT system.

The dynamic link >>



The traceability systems have a cost, but non-having them it is a more losing fact for the producers, customers, delivery companies, etc.

The main dates to be provided are: the batch number of the raw materials, the manufacturer ID, the biodegradability of the materials, some systems provide a feedback, etc.

In traceability systems a major role is played by the labels that can contain also indicators to provide information for the customers, branding and identification of the products.

Systems used as traceability systems:

- European Article Numbering (EAN)
- House - system TÜV Rheinland Cert GmbH
- Uniform Code Council (UCC)
- Barcodes
- Two-Dimensional Coding
- RFID
- Paper using Forms

While technological advancements, in general are well received, their applicability and

appropriateness to the level of need and capacities of would-be adopters have to be taken into account.

In the case of packaging machinery, availability and purchase may not be a problem, but after sales services and maintenance could be a limiting factor later on.

A major factor is the recyclability of the packaging material, this means that there are different ways to collect, reuse of the waste from the packaging materials, technologic possibilities to re-manufacture other items, etc.

Using modern traceability systems it is easy to identify:

- All stages involved in the fabrication of a product;
- The origin of the ingredients and components;
- The ingredient and the raw material suppliers;

- The places where the products and ingredients are warehoused;
- The equipment used in the production or manipulation of the products;
- The production, distribution and sales batch numbers.

Thus, the traceability systems improve the quality, the service and the global efficiency of you company. An example is TEMPIX system which indicates the freshness of the product.

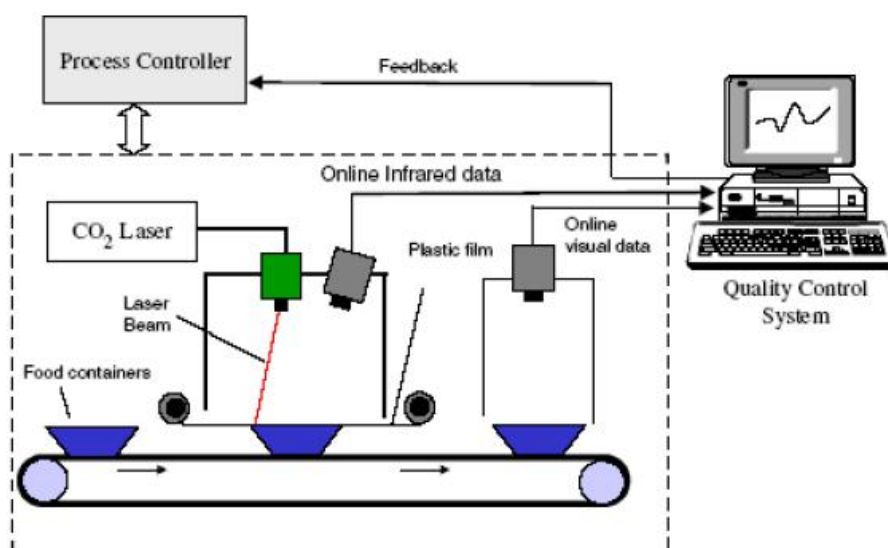
Packaging equipments

The packaging systems include sustainable food packaging equipments, that have the possibilities to realize all the necessary features: packaging, labeling, traceability on the food chain, etc. An example of such a system is described in the European project PicknPack (www.picknpack.eu), coordinated by (Wageningen UR, Netherland).



Flexible robotic systems for automated adaptive packaging of fresh and processed food products

Schematic diagram showing a complete sealing and monitoring system



5. Design of the equipments in accordance with the EHEDG principles

HYGIENIC DESIGN OF THE PACKAGING EQUIPMENTS

1. Relevant '**materials in contact**' rules.

Machinery designed such that these materials can be clean before use. Where this is not possible, disposable parts must be used;

2. All surfaces, including their joints, must be **smooth**, and must have neither ridges nor crevices which could harbor organic materials;

3. Projections, edges and recesses must be minimized,

4. All surfaces in contact with food must be **easily cleaned** and disinfected, where possible after removing easily dismantled parts. *Inside surfaces curves must be reduced to facilitate cleaning;*

5. Liquids, gases and aerosols derived from foodstuffs and cleaning should be completely discharged (if possible, in a cleaning position) - **Drainable**

6. Design and construction should prevent the entry of liquids or animals and prevent accumulation of soil in areas that cannot be cleaned – **No Niches**

7. Design and construction such that no ancillary substances (**e.g. lubricants**) can come into contact with foodstuffs. Compliance should be able to be checked.

Quality

The art of producing a product without changing its characteristics – good hygienic design maintains product in the main product flow.

Safety

The art of producing a product without adding anything to it unexpected – good hygienic design

prevents the transfer of transfer of hazards substances.

Efficiency

The ability to access all product(equipments) contact areas to facilitate the cleaning of the surfaces to eliminate the possibility of contamination the packaging line.

In accordance with the European Regulations regarding the safety of the food products on the packaging equipments, the Regulation 852/2004 stipulates:

Surfaces and the equipment;

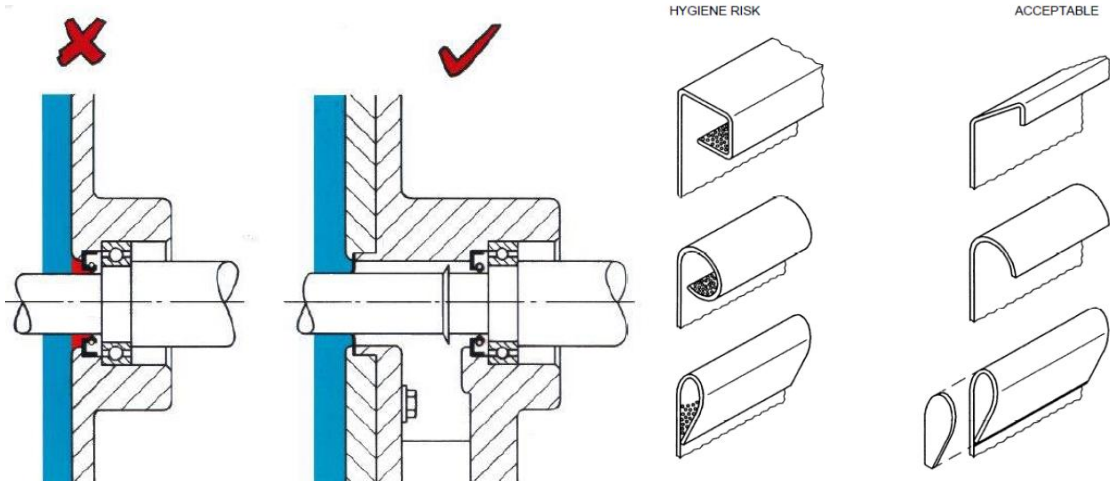
- Easy to clean and disinfect;
- Smooth, washable, corrosions free, and use of non-toxic materials;
- They have to be kept in good working state, and be repaired when needed to minimized the risk of contamination;
- The equipment has to be installed so, to allow cleaning it and the surrounding area.

Also, other important directive is EC Directive 2006/42/EC, the Machinery Directive, BS EN ISO 14159/2008, Safety of machinery, hygiene requirements for the design of the machinery.

The requirements for the machinery used in food processing and packaging are developed, underlined and make public by the European Hygienic Engineering & Design Group (EHEDG, www.ehedg.org).

Example of a design in accordance with the hygienic requirements;

Also, in manufacturing the equipments the surface finish (RA) has to be at a level to enable the maintenance of the cleaning.

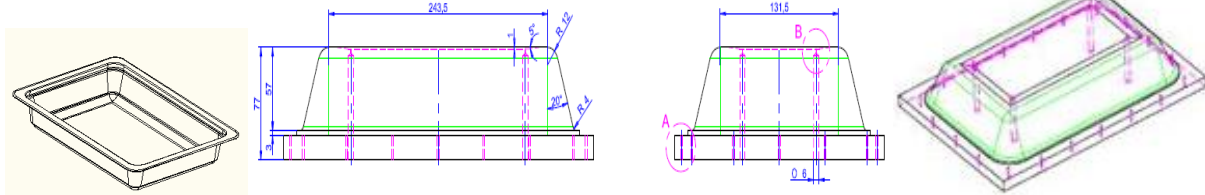


6. Case Study for Food Packaging developed at Rodax

wood by-products. We realized the design of the prototypes.

FORBIOPLAST project Packaging of food products in biodegradable films and food trays made from biodegradable biopolymer based on

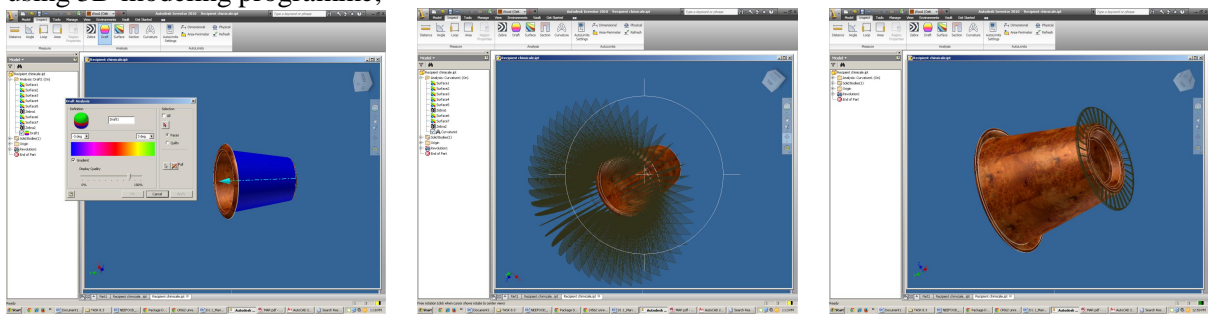
Food tray design



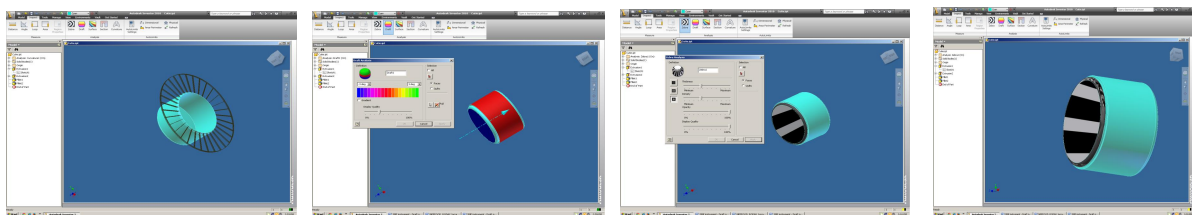
Food tray sealing frame used to seal the film over the tray on TOP SEALING equipment.

Draft analysis, curvature analysis, of the container.

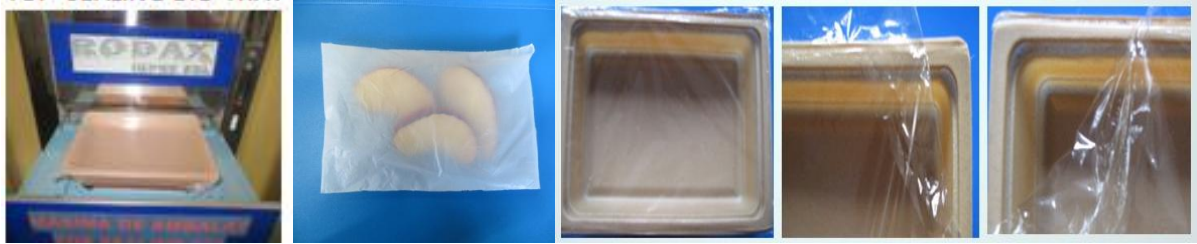
Chemical container – design of prototypes using 3D modeling programme;



Cosmetic container analysis



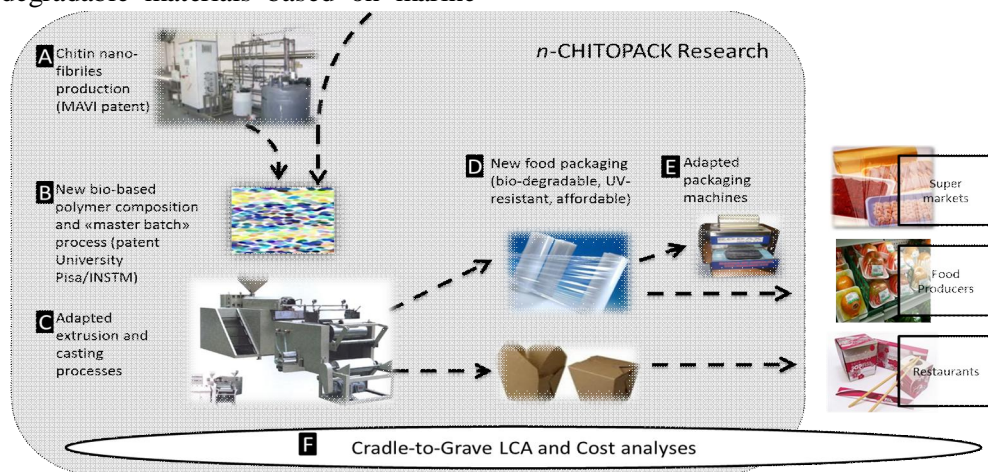
TOP SEALING BIO-TRAY



N-CHITOPACK project (www.n-chitopack.eu)

Packaging materials for food products made from biodegradable materials based on marine

waste products, chitin/chitosan with master batch from biodegradable polymers.



We analyzed the compatibility of the packaging materials with the food products, using our packaging equipments.

ACTIBIOSAFE project (www.actibiosafe.ro)

The objective of the project is to realize packaging products, manufactured from

biodegradable polymers using chitin based materials from shrimp shells and realizing the method for active packaging by encapsulation with special substances as emitters for the growth of the preserving period.

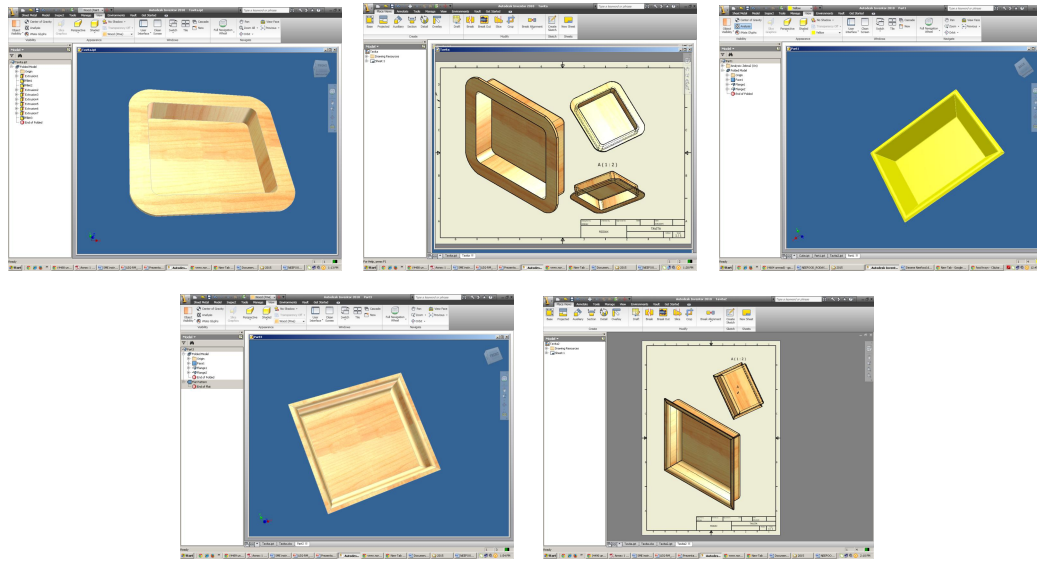
Chitosano + other bio-degradable ingredients



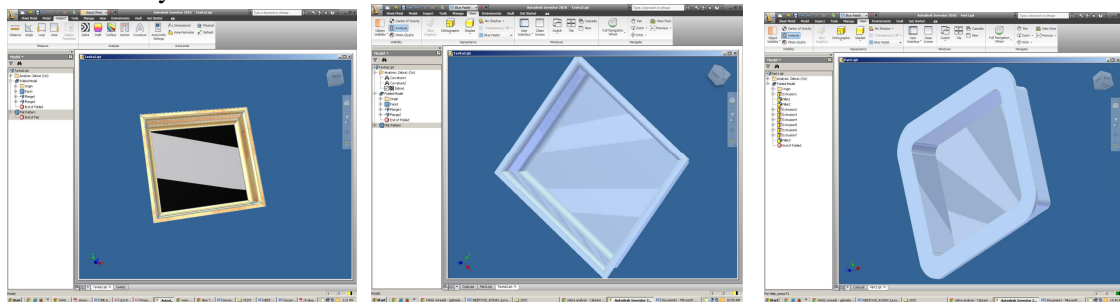
We designed the food trays that will be manufacture as prototypes in the project, using

our computer programme for parametric design (INVENTOR).

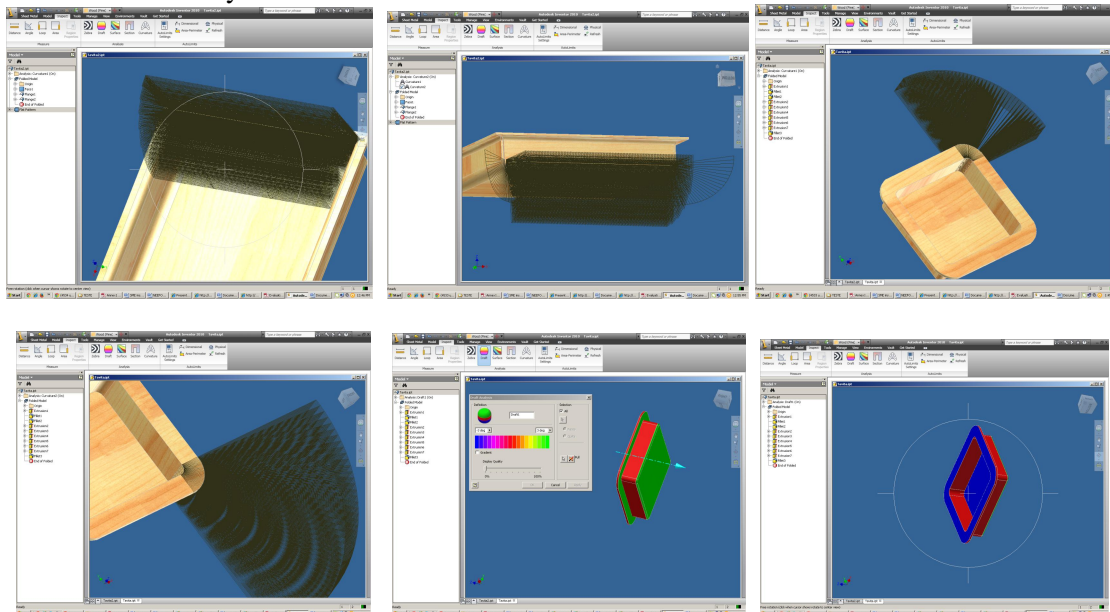
FOOD TRAY DESIGN

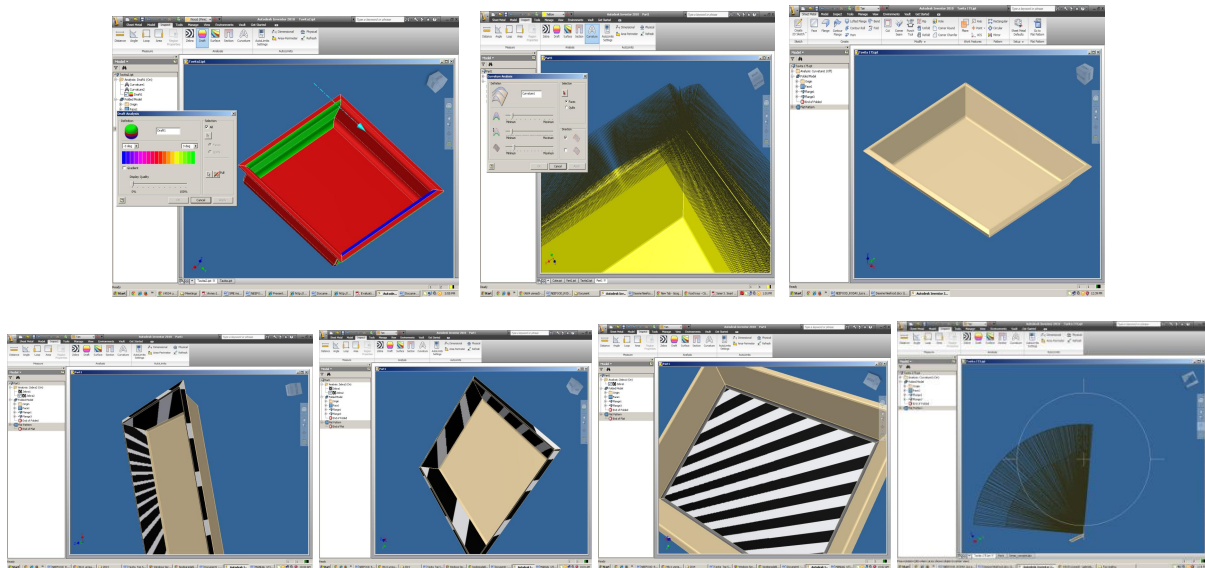


Surface analyze: ZEBRA analyze of food tray surface continuity.



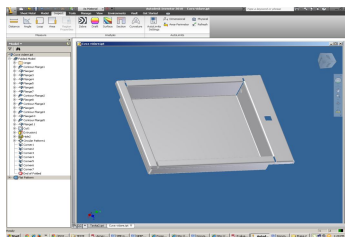
Curvature comb analyze



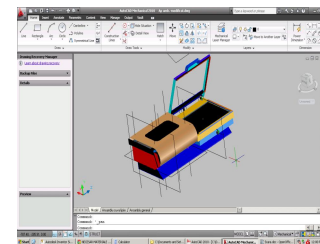
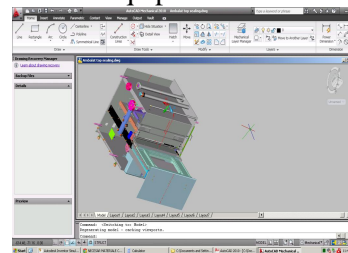


Packaging equipment assemblies in accordance with the EHEDG requirements.

Pouch fixation assembly



Detachable shelf of TOP Open able enclose SEALING equipment



Designing for digital

The number of places and ways consumers shop today demands a fresh approach to the concept of shelf appeal. What is effective in the grocery aisles may well be too subtle or simply too small to [jump out from the Smartphone](#) of a Millennial placing a grocery pick-up order during her bus ride to work. Packages that have “bill boarding” potential are a great canvas for eye-catching graphics and bold colors that characterize modern campaigns. In the two-dimensional digital shopping space, flat, fully printable packages have an advantage over curved ones partially covered by labels.

The consumer trends impact food and beverage packaging:

- Growing awareness about environmental issues;
- Health awareness going mainstream;

- The assurance of the quality of the packed product.

Conclusions

Global Market Trends Effecting Food Packaging Machinery

- Rapidly growing & urbanizing global population;
- Need to feed urban populations in a different way as they move from an agrarian based economy;
- Rapid change in food tastes & cultural eating habits. With urbanization significant shift towards more “western” protein rich diet;
- Globalization of food production led to widespread adoption of global packaging formats. Early adoptions century+ ago bottles / cans but now “newer” formats Egg: stand-up pouches;

- **Global market** for food & food packaging machinery;
- Increasingly **competitive market** with China being now the largest manufacturer of packaging equipment. Germany is still the largest exporter.

Future Trends:

- 3D Printers for Food Not strictly packaging but it is another way to get food into consumers homes sounds science fiction but it has already been done with sweets, chocolate, pasta & other foodstuffs. Supporters claim they could be as ubiquitous as microwaves in a generation! Food “inks” or components of course will still need to be produced & packaged;
- Improvements in paper / card laminates allowing cardboard containers boxes / cartons with full color print on 4 sides to replace traditional plastic trays for high barrier MAP applications;
- Down gauging / light weighting will continue in Glass, Metal, Plastics & Paper/Card Laminates bringing with it design & production challenges;
- Multi-faceted inspection systems. Multiple QA systems on production lines. Production lines may increasingly routinely incorporate: vision, x-ray, check weighing as well as seal testers;
- Active packaging - functional, timers, monitors, tracking, RFID, printed inks;
- Virtual reality, a few consumer brands have explored this but basically; the way the product itself can act as a “key” so that when viewed through for example a smartphone the product can be seen in a different context;
- Global warming is expected to substantially reduce the availability of land for growing food;
- Increased productivity and waste prevention at all stages will be absolutely key – and not just in developing countries;
- Modern packaging and distribution systems will play an inevitable and unavoidable role;
- Current supply chain losses of 40-50% in less developed countries are unacceptable (vs. estimated <5% in the UK);
- Packaging and the science and innovation that drives its development and existence is ready to meet the challenge;

In 2014, the rigid and flexible plastics segments, together, held the largest market share,

in terms of material, and were subsequently followed by the metal, and paper & board segments. The paper & board segments are estimated to grow at the highest CAGR from 2014 to 2019.

This report includes market size, in terms of value (\$million). It provides both, qualitative and quantitative analyses of the food packaging market, the competitive landscape, and the preferred development strategies of key players.

The key players invest heavily in the expansion of their business and development of new food packaging material to maintain a competitive edge in the market. The key players were observed to prefer new joint ventures, agreements, collaborations, and expansions as strategies to enhance their production facilities and acquire a larger share in the market.

Sustainability has been a major innovation driver in the Rigid Plastics packaging sector with a focus on recycling, either by using recycled plastics such as rPET or being recyclable by enabling different materials to be separated for easier collection.

Cost saving as an innovation driver in the Rigid Plastic packaging sector has focused mainly on waste reduction through increasing package robustness, portion control, and deriving the maximum efficiency from the packaging; increasing shelf product life through improvements in sealing, oxygen barrier improvements and reduction in bacteria growth; and light-weighting by replacing glass containers, and developing thinner pack walls and redesigning shapes to reduce the amount of packaging needed. Many different companies surveyed, mentioned a high interest in bio-based materials especially for the large industrial players. Most mentioned that the greater price of such material could be a bottleneck for their use. They pointed out that the new product to be easily up taken into company should be ecologically friendly, in accordance with EU standards and appropriate for food requirements.

Special packaging methods like MAP, active and intelligent packaging have many advantages:

- a) Increased shelf-life allowing less frequent loading of retail display shelves;
- b) Reduction in retail waste;
- c) Improved presentation-clear view of product and all round visibility;
- d) Hygienic stackable pack sealed and free from product drip and odor;
- e) Easy separation of sliced products;
- f) Little or no need for chemical preservatives;

- g) Increased distribution area and reduced transport costs due to less frequent deliveries;
- h) Centralized packaging and portion control;
- i) Reduction in production and storage costs due to better utilization of labor, space and equipment.

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POTENTIAL OF USING BIOMASS RESOURCES IN PYROLYSIS SYSTEMS TO OBTAIN HEATING IN RURAL COMMUNITIES FROM ROMANIA

A. FILIPOVICI*, D. TUCU*, M. ADAM**

Abstract: *The paper presents original solutions (concepts) for valorization of biomass resources as agricultural waste or wood exploitation, from rural areas of Romania, by pyrolysis systems. The aim is to create a technical-social-economical concept for energy production. The paper also, defines general aspects regarding the possibilities to use pyrolysis products for district heating and electricity, in simple and cogeneration systems, valorising the biomass resources in rural area of Romania. For finding the amount of dedicated biomass resources from agricultural and wood exploitation, that can contribute to energy production, in this study is presented the theoretical yield potential, achievable energy content and will estimated a heating power necessary and consumption based on a scenario, using the products from pyrolysis biomass process. Based on application of an original input-output model for the analysis of local potential in Romania, the final objective of the paper is to develop a small capacity system for conversion of biomass in energy, able to transform the biomass energy into syngas, bio-oil and char. The results of present analysis will be used for designing, manufacturing and testing of new pyrolysis equipment for different biomass resources.*

Keywords: *pyrolysis, biomass, bio-oil, equipment, achievable energy.*

1. Introduction

Energy from biomass is recognized as the renewable energy source with the highest potential towards sustainable development in the near future (Van de Velden, 2008).

To exploit the full potential of this energy source, new approaches and modern technologies are needed.

In Romania, 45 % of the population lives in rural environment, most of them without having possibility to connect to a district heating network.

Unfortunately, in countries undergoing development, and rural areas, the most important renewable fuel is wood, and represents a significant proportion as source for house heating. This situation could be changed, using other unexploited biomass resources which can be converted and used as fuel: agricultural residues - such as wheat straw, corn cobs, rice hulls, coconut, energetic plants, residues from forest and wood exploitation etc. This paper proposes pyrolysis as method for conversion technology for biomass, starting at its energy efficiency and the important advantage that liquid fuels, gas and solid char formed, being easy to store and to transport.

Pyrolysis is a thermo-chemical decomposition process of the solid fuel (biomass,

waste, fossil fuels), in the absence of oxygen, for producing chemicals, heat or/and energy. There are two main pyrolysis processes: rapid pyrolysis (used in present paper), and slow pyrolysis for active carbon preparation (Filipovici, 2014). Rapid pyrolysis at high temperature is the first step in gasification or combustion of biomass in fluidized bed reactors (Sjöström, 1990).

If the purpose is to maximize the yield of liquid products resulted from biomass pyrolysis, a low temperature, high heating rate, short gas residence time process would be required. For a high char production, a low temperature, low heating rate process would be chosen. If the purpose were to maximize the yield of fuel gas resulting from pyrolysis, a high temperature, low heating rate, long gas residence time process would be preferred.

Biomass is a mixture of structural constituents (hemicelluloses, cellulose and lignin) and minor amounts of extractives which each pyrolyse at different rates and by different mechanisms and pathways. It is believed that as the reaction progresses the carbon becomes less reactive and forms stable chemical structures, and consequently the activation energy increases as the conversion level of biomass increases (Bridgwater, 1999; Demirbas, 2011; Elliot, 1991).

Energy renewable source	Annual energetic potential	Field of application
Thermal solar energy	60*10 ⁶ GJ	Thermal energy
Photovoltaic solar energy	1200 GWh	Electrical energy
Wind energy	23000 GWh	Electrical energy
Hydro energy	46000 GWh	Electrical energy
Biomass	318 *10 ⁶ GJ	Thermal energy
Geothermal energy	7* 10 ⁶ GJ	Thermal energy

The national potential of renewable energy estimated in Romania, based on the evaluation on the National Action Plan for Renewable Energy (PNAER) is presented in the table 1.

The biomass potential is evaluated as more than 50% of the total potential of renewable

energy resources evaluated in Romania, also representing more than the expected target of energy from renewable sources corresponding to 2020 for Romania (Plan action for bioenergie, 2014).

2. Method

For finding the amount of dedicated biomass resources from, agricultural and wood exploitation, that can contribute to energy production, in this study was presented the theoretical potential energy content, was estimated a heating power necessary and consumption based on a scenario, to reduce conventional sources for heating, using the products from pyrolysis biomass process.

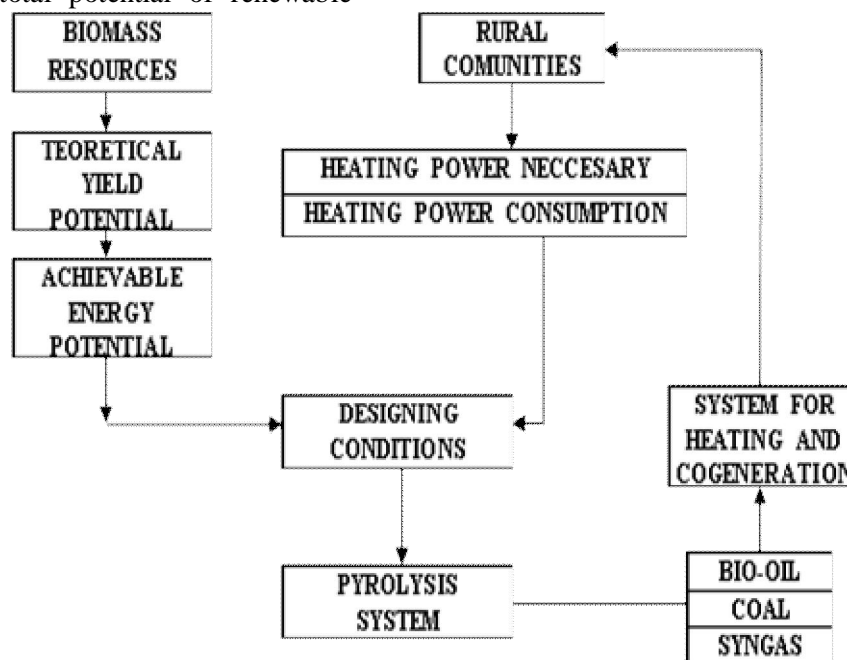


Fig. 1. Analysis strategy for harnessing biomass through a pyrolysis system

This method describes how much primary energy input is needed in order to obtain one unit of energy used for heating.

To be able to calculate the amount of energy needed is proposed the algorithm of following equation:

$$Q_{Ach} = \sum_I TYP (W_{char} \times HHV + W_{bio-oil} \times HHV) - Q_P - Q_O$$

Where :

Q_{Ach} - Achievable energy potential;

TYP - Theoretical yield potential;

f_{char} - percent of char from pyrolysis conversion;

$W_{bio-oil}$ - percent of bio-oil from pyrolysis conversion;

HHV - High heating value;

Q_P - Energy of biomass preparation for pyrolysis;

Q_O - Energy of pyrolysis operation process.

Table 2. Theoretical yield potential

NR	REGION	Forest Biomass [T] x 10 ³	Wood Chips [T] x 10 ³	Agricultural Biomass [T] x 10 ³	Urban Waste [T] x 10 ³	Total [T] x 10 ³
1	Dobrogea	54	19	844	182	1099
2	Moldova	166	58	2332	474	3030
3	Munții Carpați	1873	583	1101	328	3885
4	Platoul Transilvaniei	835	252	815	548	2450
5	Câmpia de vest	347	116	1557	356	2376
6	Subcarpații	1248	388	2569	1314	5519
7	Câmpia de sud	204	62	3419	1350	5035
8	TOTAL	4727	1478	12637	4561	23403

2.1. Theoretical yield potential

Theoretical yield potential includes all biomass production (in terms of weight) in a certain area and depends on the type of biomass and environmental specific of the region (Romanian National Institute, 2009). Romania has a high potential for recovery of agricultural waste, especially in the southern and western region.

These regions have high agricultural production, but after harvesting crops are usually burned. There are also large quantities of wood waste in the form of small pieces, but lacks organization of collecting and transport.

These wastes represent valuable resources that can and must be valorized, using conversion processes as pyrolysis. For analyzing the biomass local potential Romania has been divided in regions, evaluating sources from: forestry wood waste, agricultural biomass waste, municipal

organic waste. The data for each region are presented in Table 2.

2.2. Achievable energy potential

Achievable energy potential is one part of the theoretical yield potential which can be obtained, converted and used in the economic energy system. Economic aspects such as cost preparation (grinding, drying), operation process cost and benefit through energy price obtained, in modern system are being considered in evaluating the achievable energy potential.

Delivered feedstock typically requires processing prior to being fed into a pyrolysis reactor to avoid penalties that reduce yields and increase heat requirements. Mechanical particle-size reduction and drying are commonly used in thermo chemical processes (Mark M, 2010).

Grinding biomass is an expensive and energy-intensive process. Specific energy requirements can vary based on equipment and feedstock

Table 3. Achievable Energy Potential

	Forest Biomass		Wood Chips		Agricultural Biomass		Urban Waste		Total
Theoretical yield potential	4727 [T] x 10 ³		1478 [T] x 10 ³		12637 [T] x 10 ³		4561 [T] x 10 ³		23403 [T] x 10 ³
Predicted w % and HHV of Bio-oil	75 %	17 GJ/T	70 %	20 GJ/T	70 %	22 GJ/T	35 %	15 GJ/T	
Predicted w % of and HHV of Char	10 %	30 GJ/T	15 %	32 GJ/T	15 %	24 GJ/T	45 %	21 GJ/T	
Bio-oil energy from pyrolysis (HHV)	60269 TJ		20692 TJ		194609 TJ		23945 TJ		299515
Char energy from pyrolysis (HHV)	14181 TJ		7094 TJ		1895 TJ		43101 TJ		66271
Preparation Cost	17395 TJ		5439 TJ		46504 TJ		16784 TJ		86122
Operation cost	8839 TJ		2763 TJ		23631 TJ		31386 TJ		66619
Achievable Energy Potential	48216 TJ		19584 TJ		126368 TJ		18876 TJ		213044 TJ

conditions. A common assumption is that 50 kWh of energy is required per ton of ground biomass. This model employs research by Mani et al. (Mani, 2004) that correlates the grinder screen size to the energy requirement for a hammer mill based on various types of biomass.

The energy consumption for grinding biomass from a mean chop size of 7.15 mm to between 3.5 and 0.5 mm is approximated by the following equation: Energy [kWh * ton-1] = 5.31 * size² – 30.86 * size + 55.45. Feedstock drying is very important for thermo chemical processes. Moisture embedded in the feed consumes process heat contributes to lower process yields. For reasonable pyrolysis performance, moisture content of less than 7% is recommended (Bridgwater, 2003 b). Biomass drying typically requires about 50% more energy than the theoretical minimum of 2442 kJ per kg of moisture evaporated (Brown, 2003).

Operation process cost, is represented mostly by the heat required in the pyrolysis reactor.

Large-scale reactors require a direct form of heating such as burner and could use the hot gases from the process as the fluidizing agent. A possible scheme is to combust pyrolysis gases in the combustion section prior to recycling back to the pyrolysis reactor. Studies made on a pilot-scale pyrolysis system to determine the enthalpy for pyrolysis, on a dry basis, show the energy necessary to pyrolyze these fuels varies between 0.8 and 1.87 MJ/kg (Brown, 2003).

The main product, bio-oil, is obtained with a maximum yield of 60–75 wt% (dry matter), together with char and gas (Smolders, 2006).

These by products can be burnt externally (to dry the biomass, in combustion etc.) or in the process, to supply the endothermic reaction heat of pyrolysis (Van del Velden, 2010). Char in itself has a heating value (Bridgwater, 2003 b; Faaij, 2006; Prins, 2005) comparable to petroleum cokes (“petcoke”), and can externally be valorized. The moisture content of the pyrolysis feedstock shall not exceed 10 wt% to limit the water content of the bio-oil.

2.3. Heating power necessary (hourly)

Heating power necessary for the rural residences has been estimated, using global values reported to the heating surface of the residences. In Romania, according to the National Institute of statistics there are 3 125 960 residences in rural area.

Table 4. *Estimated maximum hourly heat power for rural residences*

Residence Surface	Units	Heated Surface of Residence [m ²]	Hourly maximum Heat energy necessary MW
< 20	817556	14.4	753.93
20 - 49	1720173	28.6	3150.57
50 - 99	540974	43	1488.76
100 - 150	45482	59.4	173.01
> 150	1781	88	10.036
Total	3125960	-	5576.63

Table 5. *Total energy consumption in one year for rural residences*

Period	T _{monthly} avg. [°C]	No. of days for heating	Heating hours per day	Hourly energy consumption [GW]	Total energy necessary per year [GWh]
19 oct - 31 oct	11	13	24	1,394	368,016
1 nov - 30 nov	5,6	30	24	2,320	1670,4
1 dec - 31 dec	0,8	31	24	3,017	2244,648
1 ian - 31 ian	-1,6	31	24	3,485	2592,84
1 feb - 28 feb	1,2	28	24	2,952	1983,774
1 mar - 31 mar	5,8	31	24	2,294	1706,736
1 apr - 9 apr	11,2	9	24	1,373	296,568
TOTAL					10862,952

According to Romanian normative C107-2005 for global heat calculation of surface, using an unique conventional value of residence high

2.5m, the value for necessary heat on surface is 64.04 Wh (m³ y) for a temperature of -15°C (Romania Normative, 2005).

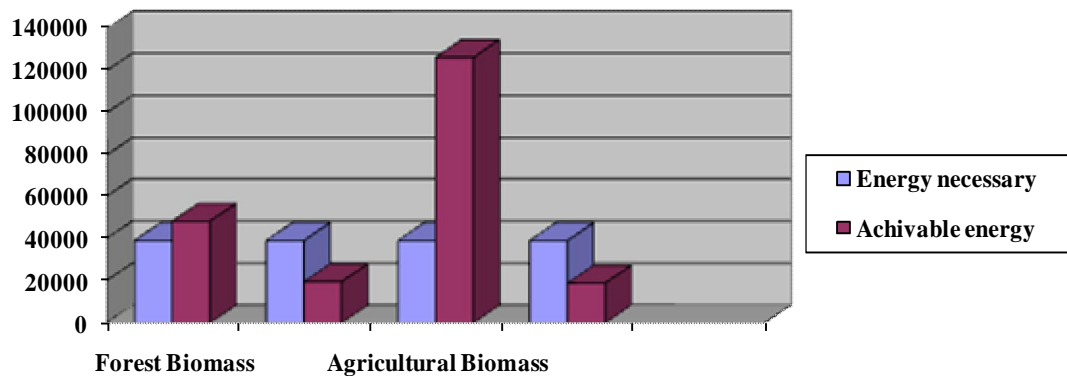


Fig. 2. Achievable energy and Heating necessary

2.4. Heating power consumption

Heating power consumption for rural areas was estimated, using the hourly necessary on each month with the specific temperature, calculating the number of days for heating and total energy consumption for one year, according to the algorithm of Romanian standard SR 4839 and SR 1907/2 (Constantinescu, 1997).

3. Results and discussions

In figure 3, are presented results of achievable energy (in TJ) from different products of biomass that can assure the heating necessary for rural environment. As it can be seen in this results, feedstock as agricultural or forest residues can supply the entire heating demand for rural area.

Although the standard asks for more detailed analysis of the energy chain as consideration of transport, transmission, storage and other processing should be included, this has not been implemented into this study since those factors varies from case to case. The estimated values used in this paper show the potential for the entire country, in practice, this analysis method will be implemented on different scale, depending on the size of area, energy potential and energy heating necessary, using the same algorithm.

3.1. The designing conditions

The designing conditions will be fixed after the evaluation of the energy potential and consumption, to be able to establish the size and scale of proposed pyrolysis system, the functional parameters and expected amount of products obtained in the process. The proposed design strategy (figure 2) must be realized firstly considering the sources of biomass, storage and drying treatment available. The designing and modeling conditions, depend on physical parameters, system functional parameter and products that must be obtained. To be able to ensure the heat balance of pyrolysis and to obtain the amount of desired percent of fuel is necessary to predict/calculate these parameters.

The proposed designing model is a fast pyrolysis system with following: Process Steps, Section Description and Key Assumptions, as described in Table 6.

The interest in fast pyrolysis as a pretreatment step arises from the following considerations:

- Bio-oil from fast pyrolysis has a density of 1200 kg/m³ compared to some biomass with a bulk density as low as 100 to 150 kg/m³. The energy content of bio-oil is about the same as biomass. Transport costs are thus much lower since most solid biomass transportation is constrained by volume rather than weight.
- The alkali metals in biomass which can cause severe problems in gasification and gas cleaning are almost entirely retained

in the char almost all of which is separated in the fast pyrolysis process.

➤ Handling, storing and transporting liquids is much easier and hence lower cost in both financial and energy terms than solids. This applies to both the bio-oil production site and the reception at the biofuel production site.

➤ Feeding liquid to a gasifier is easier and thus lower cost than solids, particularly for pressurised operation.

➤ The gasifier products will have lower tars and much lower alkali metals thereby reducing gas cleaning and maintenance requirements (Bridgwater, 2009).

Table 6. *Process Steps, Section Description, Key Assumptions (Mark, 2010)*

Process Steps	Size Description	Key Assumptions
Chopping	Particle size reduction to 10 mm	Incoming biomass average size of 10 to 25 mm
Drying	Biomass drying to 10%	Steam drying at 200°C
Grinding	Particle size reduction to 3 mm	Incoming biomass maximum size <10 mm
Pyrolysis	Biomass conversion to pyrolysis products	450-600°C and 1 atm, short residence time 1-2 s, 2.75 kg of fluidizing gas/kg of biomass. Heat provided by a burner.
Solids Removal	Removal of entrained solid particles from vapor stream	90% particle removal
Bio-Oil Recovery	Collection of condensing vapors	Rapid condensation to about 50°C in W% of 60-75 %, collection of aerosols 95%
Storage	Storage of bio-oil and char	4 weeks storage capacity
Combustion	Provides heat and steam generation	120%

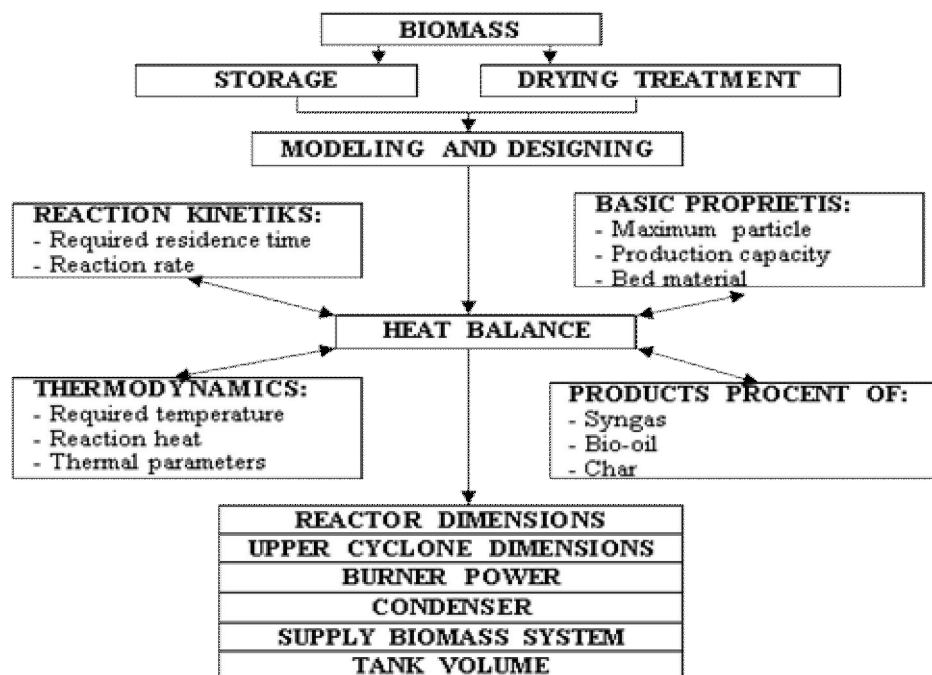


Figure 3 *Proposed design strategy for pyrolysis system*

Conclusions

Present paper has proposed to define general aspects regarding the possibilities to use during the condensation of the pyrolysis liquid and gaseous product. The heat is available in a temperature range from approximately 500 °C to 25 °C and could hence be used for steam superheating, feedwater, but also for District Heating generation. The analysis confirms the

pyrolysis systems to obtain products for district heating, valorising the biomass resources in rural area of Romania. The process can be further improved by integrating heat that is set free opportunities, possibilities and necessities for actually demands regarding sustainable development in Romanian rural/agricultural areas, by giving a new, nonconventional and feasible technical solution. Further an economic analysis should be carried out in order to show

potential economic benefits. The integration itself seems to be viable a statement that is supported by a press release from June 2009 where boiler manufacturer Metso and forestry company UPM announced the development of a new viable fast pyrolysis process benefitting from the integration with a CHP plant (Press release, 2009).

Based on present results, next step of the researches will be designing of equipment, manufacturing and testing pilot station.

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UNHEALTHY FOOD CONSUMPTION AT CHILDREN FROM RURAL AREAS FROM REPUBLIC OF MOLDOVA

A. Zaporojan¹, V. Zepca¹, M. Tarcea², A. Jucov³

Abstract: *The purpose of this study was to evaluate unhealthy eating habits of students from rural areas from Republic of Moldova. This was a cross-sectional study, based on questioning a sample of 1236 students from 10 schools from Republic of Moldova located in rural areas covering three regions of Moldova country – central, north and south. The habit of unhealthy eating, also oversized or incorrect cooked foodstuffs was found in more than half of families of surveyed students. For preventive and educational purposes is required to develop new teaching subjects adapted to eating practices registered in our schools.*

Keywords: *nutrition, students, risk behavior*

1. Introduction

Nutrition is an important behavior that contributes to children with healthy status. Dietary risk factors based on excessive consumption of sugar, animal fats, salt, preservatives and dyes and also the unhealthy food preparation can be considered important factors that favors the occurrence of cardiovascular disease, the leading cause of death in the population [1].

The excess of carbohydrates is the cause of various diseases like dental caries, obesity, diabetes, atherosclerosis and others. Lack of fats in diet is the cause of reducing growth, appearance of liver suffering, hair loss or decreasing resistance to skin infections. Excess of fats for children, leads to obesity and atherosclerosis, that can cause cardiovascular diseases to adult [2]. Carbonated soft drinks and sweets, even chewing gum are favorite foods for young people and often used by parents as desserts and snacks. They can cut the appetite for nutritious foods, can destroy teeth, cause obesity and diabetes, produce a relative deficiency of vitamin B1 with appearance of neurasthenia [3].

Accordingly to the WHO study, excessive salt consumption causes high blood pressure in all age groups. The most important is that children are sensitive to salty taste, which can later become a habit to eat very salty food. If blood pressure above normal values begins in childhood, for sure it will continue to grow and hypertensive patients are the first victims of heart diseases in old age [4].

Studies show that reducing salt intake by half, would reduce by 24% the frequency of

strokes and by 18% the coronary heart disease. Recommended daily intake of salt for adults is 3 grams. In EU, only 11 countries have accepted the reduction of salt intake by 16% between 2008 and 2012. Salty products are also the main cause of obesity. The British government issued a directive that advises parents not to allow children aged 1 to 3 years to consume more than two grams of salt per day. Children between ages of 4 and 6 years should not exceed three grams per day and for 7 to 10 years old the limit is five grams per day [5].

2. Materials and methods

Our study was an transverse descriptive one, conducted on a sample of 1236 students, aged 13-19 years, from VII -XII classes collected in 10 schools from Republic of Moldova, located in rural areas that included the center, north and south of the country, during September- October 2014. It was used for data collection an anonymous questionnaire which included a small number of items about eating habits, and completed with an adapted questionnaire used for the study of Health Behavior in School Aged Children (HBSC) conducted in 2009-2010 by the WHO in the countries of the European Union [6].

The study included 545 boys (44.1%) and 691 girls (55.9%)

3. Results

The daily consumption of carbonated beverages containing preservatives and dyes, was registered at 6.9% of students (boys - 9.1%, girls - 5.4%), also consumption of this drinks several

times per week was present at 31.9% of students (boys - 36.6%, girls - 28.2%), and for a few times a month at 28.1% of our students (boys - 25.2% girls - 30.2%).

Frequency of those who do not drink carbonated preservatives and colorings drinks is only for 12.2% of students (boys - 12.7%, girls - 11.8%) (Figure 1).

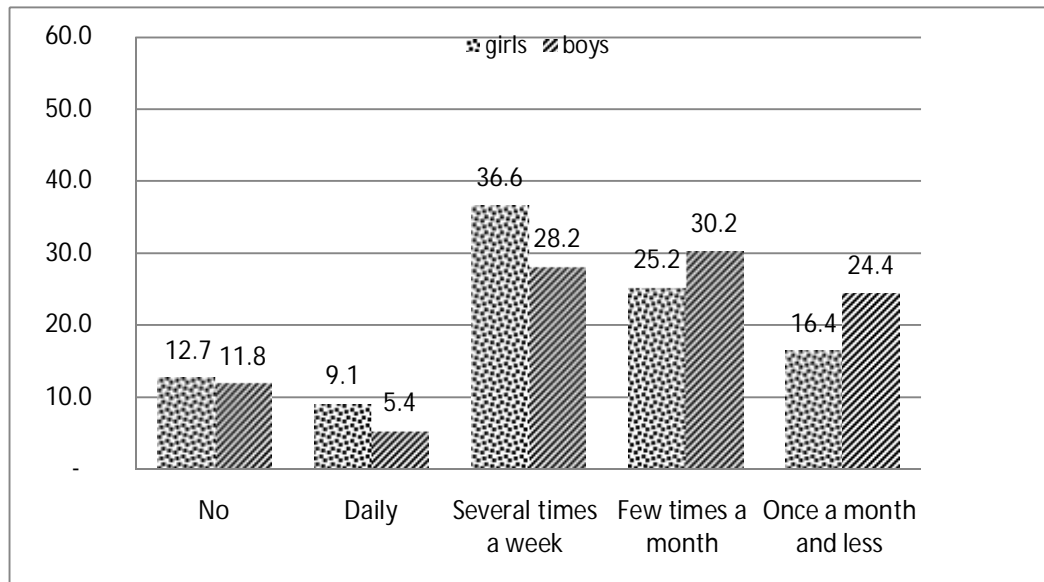


Fig. 1. Consumption of carbonated drinks with preservatives and dyes among students (%)

Our surveyed students were consuming daily foods with high sugar content 26.3% (boys - 24.1%, girls - 28.1%), and with a frequency of several times a week 49.8% of students (boys - 51.2% , girls - 48.7 %). Foods with high content of sugar are consumed once a month or less by 4.2% of students (boys - 3.5%, girls - 4.7%) (Figure 2).

Foods with high sugar content (candies, chocolate, cakes, biscuits and other sweets) are eaten frequently or occasionally by 95.4% of our rural areas students (girls - 96.8% and boys - 93.7%, with statistic difference in between $p < 0.05$).

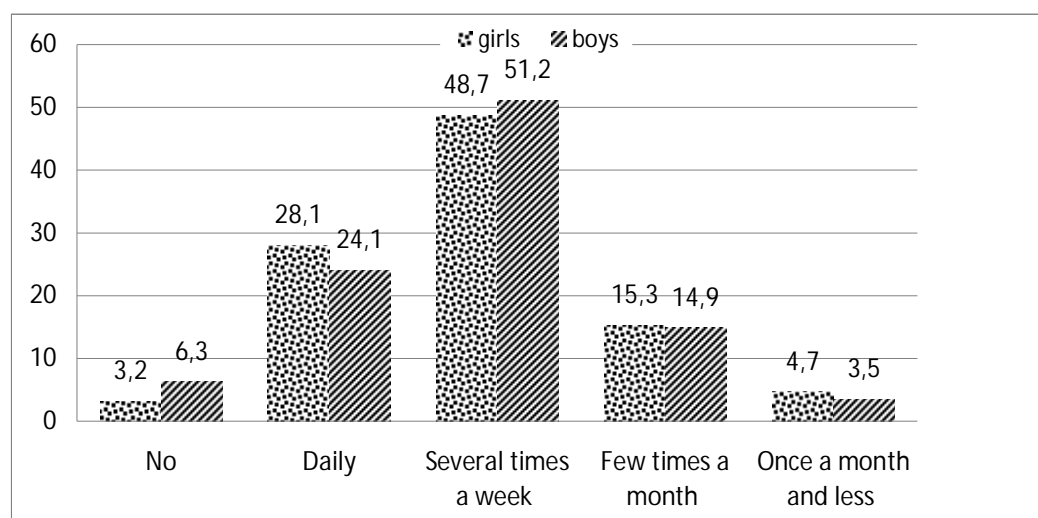


Fig. 2. Students consumption of food products with high sugar content (%)

Foods with high fat content such as: chips, pizza, hamburgers, hot dogs are consumed daily by 4.7% of surveyed students (boys - 5.1%, girls - 3.9%), also several times per week by 21.6% of students (boys - 25.7%, girls - 18.3%), and for a few times per month by 26.2% of students (boys - 24.6%, girls - 27.6%). A share of 20.6% of students (boys - 15.2%, girls - 25.1%) were consuming fatty foods once a month and less, and 26.9% of them did not consume such products. The share of students that frequently or occasionally were consuming foods with high fat content is high (73.1% in total, girls - 74.9% and boys - 70.6%).

Daily consumption of foodstuff with high salt content: crackers, salted pretzels, salted sticks, peanuts, salted cheese was registered for a share of 8.9% of students (boys - 8.8%, girls - 9.1%). Several times a week this type of foods were

consumed by 34.7% of students (boys - 38.4%, girls - 31.8%). The percentage of students that consumed salty food once a month and rarely was 14.4% (boys - 11.2% and girls - 16.9%).

Dishes preparation by frying oil and roasting on grill is used by 60.2% of the student's families (girls - 57.9% boys - 62.5%).

A share of 39.6% surveyed students do not have a school buffet. On the contrary, a rate of 60.4% of high school students surveyed in rural areas have a buffet in the school. From their buffet they were buying buns - 35.7% of students, also biscuits, pretzels and salted sticks by 21.9% of students; pies - 21.1% and chewing gums - 10.7% of students.

Unhealthy products like chips, salted nuts, donuts are purchased from buffets by a small share of students, only 1% (Figure 3).

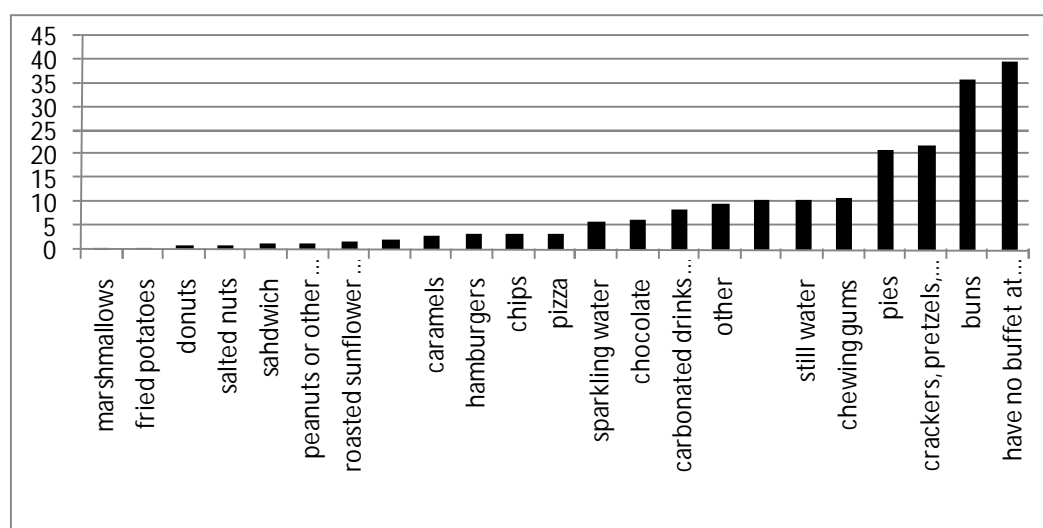


Fig. 3. Foods that are purchased by students at school's buffets (%)

4. Discussions

Most of the Moldavian, Romanian and other countries with similarities in nutritional behaviors studies are not focused on the risk factors regarding excess in high fat, sugar and preservatives foodstuffs at school but some of the studies sustained the same idea that usually the pupils from rural areas has a tendency for eating this types of food that is at risk for their health, and the cause of this orientation is mostly the lack of school training lectures and adults models to be followed [7; 8]. In the last years we

observed, like other authors did, that the frequency of obesity at children is growing, the physical activity is reducing, and the frequency of diet risk behaviors is multiplying especially at young boys from rural areas [9; 10].

5. Conclusions

The frequency of students from Moldova rural areas who eat food with high content of sugar, animal fats, salt, preservatives and dyes was very high. Custom of unhealthy food preparation is found in more than half of their

families. In order to train the students to a healthy eating behavior, it is necessary to introduce in the school curriculum teaching materials like

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ISOSTATIC PRESSING AS A WAY TO INCREASE THE SHELF LIFE OF PLANT PRODUCTS (ON EXAMPLE OF CULTIVATED MUSHROOMS *PLEUROTUS OSTREATUS* (FR.) KUMM)

V. N. Sorokopudov , N. I. Myachikova

Abstract: Due to the increase of requirements to quality of food and the import substitution program we develop the technology for the preservation of products of vegetable origin using the method of isostatic pressing. Studies have shown that for better ensure the purity of the semi-finished product from the mushrooms *Pleurotus ostreatus* (Fr.) Kumm. It is advisable to press at 400 MPa with long exposure effects (40 min. or more).

Keywords: isostatic pressing, vegetable products, mushrooms, *Pleurotus ostreatus* (Fr.) Kumm, temperature, microorganisms

I. Introduction

Existing methods of pasteurization and removal of pathogenic microorganisms by temperature effect are largely unacceptable and does not meet modern requirements in connection with the increase of requirements to quality of food by reason of the program of import substitution [1]. Insufficient heating can completely destroy pathogenic microorganisms and leads to excessive loss of taste and nutritional properties of the finished product. Preservatives change the natural taste of the product and are not always healthy.

The contemporary market demands form the industry needs in new technologies that meet the needs of modern consumers, including those associated with the processing of cultivated mushrooms. As an option of the new technology can be considered non-thermal method of pasteurization of food products with ultra-high pressure using a cold pressing machine from EPSI.

Isostatic pressing is the technology for materials processing under the influence of uniform compression. There are hot and cold pressing depending on the temperature of the process, and could be hydrostatic and gas-static pressing depending on the processing medium. Hydrostatic pressing is a type of isostatic pressing, in which the processing medium is a liquid. In the case of the cold isostatic pressing, the processing mediums are water, oil [2-4].

Technology of processing of food products under high pressure is successfully used to achieve products sterilization while maintaining the texture and flavoring qualities, using a pressure in the range of 100-800 MPa, a temperature of 20-80°C, dwell time up to 30 min or more. Non-thermal method of pasteurization of food

products using ultra-high pressure is environmentally safe technology [5-6]., having the following advantages:

- a wide variety of ultra-high pressure processed products;
- ability to reduce cardinaly (up to several orders) the microflora and the most important for ensuring food safety pathogens (and *Escherichia coli*, *Salmonella*, etc.);
- increase in dozens of times the shelf life of products without changing their natural flavor and color;
- the preservation of their organoleptic properties and nutritional value;
- elimination of food deformation due to uniform distribution of hydrostatic pressure (regardless of the size and shape of the product) that reduces the time of products processing;
- lack of need to use preservatives and additives that increase the shelf life of products;
- complies with environmentally friendly technology, modern requirements for environmental protection;
- lack of high energy costs.

Inactivation of microorganisms and enzymes, denaturation of proteins, modifying polysaccharides are the main consequences of isostatic pressing. However, there are a number of problems hindering the development of the pressure treatment technology. The main of them is the uncertainty in the choice of the physical exposure parameters, as far as different combinations of pressure, temperature and exposure time can give the same outcome. It is relevant to select physical exposure parameters and development of technology isostatic pressing production of cultivated

mushrooms with a view to increase the shelf life, in accordance with the indicated problem [6].

To this end, the semi-finished products were stored at a temperature of $(0\pm 2)^\circ\text{C}$ and relative humidity not more than 75%. Quality control was performed by organoleptic, some physicochemical and microbiological parameters in 3, 5, and 7 weeks. There were parameters of semi-finished products which were investigated immediately after manufacture, as a control. In samples packed under vacuum and pressure treated for 40 min, changes within 7 weeks of storage did not happen. In samples packed under vacuum and pressure treated for 5 min, the study of the organoleptic characteristics after 5 and 7 weeks was

not perform as their microbiological indicators considerably worsened. The nutritional value of the finished products is largely determined by the co-composition of ingredients included in the composition of the feedstock. In this regard, the particular interest presents a more detailed study of the physicochemical characteristics of prefabricated from mushrooms. The result of the study of physicochemical parameters of the semi-finished product from the mushrooms *Pleurotus ostreatus* (Fr.) Kumm, subjected to pressure treatment, during storage is presented in table 1. Studies show that the largest share in the total mass of the product is water, which is not changed during storage for 7 weeks.

Table 1 - Change of physicochemical parameters of the semi-finished product from the mushroom *Pleurotus ostreatus* (Fr.) Kumm, subjected to pressure treatment, during storage

Parameters	Storage time, weeks			
	0	3	5	7
Moisture content, %	$79,94 \pm 4,80$	$79,85 \pm 4,81$	$79,90 \pm 4,78$	$79,83 \pm 4,82$
Protein content, %	$4,86 \pm 0,24$	$4,80 \pm 0,23$	$4,80 \pm 0,25$	$4,78 \pm 0,23$
Fat content, %	$4,10 \pm 0,21$	$4,10 \pm 0,21$	$4,05 \pm 0,20$	$4,03 \pm 0,20$
Vitamin C content, %	$3,46 \pm 0,19$	$3,39 \pm 0,17$	$3,35 \pm 0,17$	$3,35 \pm 0,15$

Nitrogen-containing substances are one of the main components of the chemical composition of mushrooms, and, therefore, products of their processing. The protein content of the semi-finished product from the mushrooms *Pleurotus ostreatus* (Fr.) Kumm is $4.86\pm 0,24\%$ in natural substance and practically does not change during storage. Thus, the proposed product can be considered an additional source of protein in human nutrition. Due to the fact that the semi-finished product was manufactured with the use of fat, it was determined the fat content of the freshly prepared semi-finished product and during its storage. Studies have shown that the fat content remains unchanged.

Vitamins are important in human nutrition. One of the most labile vitamins that are part of the semi-finished product from the mushrooms *Pleurotus ostreatus* (Fr.) Kumm, is vitamin C. As the results of the studies, the change in the content of vitamin C during storage occurs slightly, possibly even within experiment error.

Given that the developed products are products of long-term storage, it is necessary to pay attention to microbiological purity. Were carried out microbiological examinations to identify microbiological indicators, specific to product group to which refers the investigated semi-finished product (table 2).

Table 2. Change of microbiological parameters during storage of semi-finished products from the mushrooms *Pleurotus ostreatus* (Fr.) Kumm, subjected to different processing methods

Name of parameters	Processing method	Thermal and steam treated semi-finished product			
		Storage duration			
		0 days	3 weeks	5 weeks	7 weeks
1	2	3	4	5	6
The number of mesophilic aerobic and facultative anaerobic microorganisms, CFU in 1 gram, not more	vacuum	0	18×10^4	-	-
	P=400 MII $\alpha \tau = 5$ min.	0	1×10^4	14×10^4	-
	P=400 MII $\alpha \tau = 40$ min.	0	0	0	$3,0 \times 10^4$

The bacteria E. coli, product weight, which is not allowed, gram	vacuum	0	0	-	-
	P=400 МПа τ =5 min.	0	0	0	-
	P=400 МПа τ =40 min.	0	0	0	0
Coagulasepositive staphylococci, product weight, which is not allowed, gram	vacuum	0	0	-	-
	P=400 МПа τ =5 min.	0	0	0	-
	P=400 МПа τ =40 min.	0	0	0	0
Bacteria of the genus Proteus, which is not allowed, gram	vacuum	0	0	-	-
	P=400 МПа τ =5 min.	0	0	0	-
	P=400 МПа τ =40 min.	0	0	0	0
1	2	3	4	5	6
Fungi, CFU in 1 gram, not more	vacuum	0	0	-	-
	P=400 МПа τ =5 min.	0	0	0	-
	P=400 МПа τ =40 min.	0	0	0	0
Pathogenic microorganisms, including bacteria of the genus Salmonella, product weight, which is not allowed, gram	vacuum	0	0	-	-
	P=400 МПа τ =5 min.	0	0	0	-
	P=400 МПа τ =40 min.	0	0	0	0
Mesophilic Clostridium sulfur-reducens, which is not allowed, gram	vacuum	0	31×10^4	-	-
	P=400 МПа τ =5 min.	0	0	12×10^4	-
	P=400 МПа τ =40 min.	0	0	0	0

Conclusions

In the studied semi-finished product, vacuum processed, noted an increase in overall contamination above acceptable levels and sulfite-reducing clostridia to 31×10^4 in 1 gram of the first 3 weeks of the study. In connection with this fact in subsequent periods of the experiment the study samples this option was not carried out.

Although microbiological indicators of prefabricated, pressure treated with an exposure of 5 minutes, are within acceptable standards for 4 weeks, total contamination him on the fifth week increased, and in the crop clostridia appeared.

Mushrooms Semi-finished product treated with vacuum and pressure of 400 MPa with the exposition of the impact of adopting 40 min, at all periods of the study were inadequate microbiological purity. In accordance with established standards in the absence of processed vacuum and pressure raw mushrooms bacteria E. coli (bgcp) to 1.0 gram, and Staphylococcus aureus in the 1.0 gram, Proteus to 0.1 gram.

Thus, with a view to better ensuring the purity of the semi-finished product from the mushrooms Pleurotus ostreatus (Fr.) Kumm - it is advisable to use the pressure of 400 MPa with long exposure effects (40 min.).

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ENGINEERING AND ETHICS OF THE MENU – ACTIVITY OPTIMIZATION ELEMENTS IN THE RESTAURATION SYSTEM

G.I. FLORESCU R. GRUIA¹

Abstract: *The objective of this paper aims to structurally and functionally streamline restaurant menus, to explore the relation between consumer's behavior and the availability of the operators from the hospitality sector to introduce in menus culinary preparations included in the ethic products gamut. The menu optimization method presented in this paper, based on multidimensional analyses, has an unprecedented character and the merit that, on one hand it facilitates the analyses of the products from a restaurant menu list after reasonable criteria, offering logical support to adopt decisions concerning menu management, and, on the other hand, it allows the selection and analyses of the menu products that bring together the dual aim to generate expected profit by restaurant operators and to promote the selling of ethic foods. The paper introduces the concept of menu ethics in the restauration system and the proposed activity optimization method is based on a creative application of multidimensional menu analysis, by introducing the „preparation ethic” factor in appreciating the performance of its components.*

Keywords: *Menu ethics, menu engineering, healthy food, multidimensional menu analysis;*

1. Introduction

The Alimentation is a biological necessity, but also a component of conviviality, through its socio-cultural dimension, a way to interact with family, with friends, with colleagues and with ourselves. Centered on bioenergetics and informational support received by every individual, the act of „eating” has evolved in function of cultural context, of historically and geographically determined ecologic, economic, biologic and technologic conditions, of behavior rituals and codes accepted at the level of human communities (Gruia, R., 2014).

From technologic perspective, food is the carrier of utility for the human individual, consisting of entrances of nutritive substances, energy and information. Practically, alimentation is a combination between metabolism and nutrition, especially functional at DNA level, being directly or indirectly influenced by environment factors, through alimentary and gastronomic profile, all these integrated on the axis *man – food - environment* (Uekawa, A., and others, 2009, quoted by Gruia, R., and others, 2014). Among the elements integrated on this

axis there is to be found **gastronomy**, whose vector with the most important impact upon organism is composed of culinary preparations and drinks selected to be consumed, combined in what we currently call „menu”.

In this large context, **menu engineering** is a field of interdisciplinary study dedicated to menu elaboration in the restauration system, but it may also be applied in any sector of activity in which the client is offered the possibility to choose between several consumption variants. In the original meaning, the „menu engineering” concept refers to the analysis methodology of a restaurant menu developed by Michael S. Kasavana and Donald J. Smith, Michigan University (1982).

Starting from biologic and technical aspects, well known in menu engineering, the present study proposes to add ethic and economic dimension to the food serving manner in different types of structures specific to the restauration system. The aim of this demarche is to improve the performance of restauration system, by increasing the consumer's satisfaction, from ethic perspective, with a positive impact concerning the perception of the quality of offered food and

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the degree of contentment, the expected managerial result consisting in the optimization of restaurant activity and in the growth of total consumption, which generates competitive advantage on an extremely competitive market, as the hospitability one is (especially in the Brasov mountain zone).

The objective of the paper aims to structurally and functionally streamline the menu, to explore the relation between consumer's satisfaction, the choice motivation of organic and ethic alternatives from restaurant menus and the availability of operators from hospitality sector to introduce in menus culinary preparations included in the healthy and ethic product range. The questions to which the paper proposes to answer are the following ones:

- Which is the perspective of the restaurant operators from the Brasov touristic region concerning ethic alimentation?
- Which is the operational method suitable for the selection of those menu items that bring together the dual aim of generating expected profit by restaurant operators and of promotion at selling ethic food.

In order to answer these questions, the paper is structured as it follows:

- in the first part there are marked out relevant studies that have contributed to a scientific approach of these problems;
- the next section is dedicated to the research methodology, it underlines the reason that was the basis of the analysis methodology of the menu adopted subsequently to the investigation and it explains the manner of data processing and the details of the decisions;
- subsequently, there are discussed the similarities and differences between this paper and previous studies, followed by the presentation of the implication in operational management of restaurants.

2. Present stage of scientific research in the approached field

The documentation stage in view of fulfilling the research aim has been expanded over three fields considered to be essential in order to shape a relevant result: (I) ethics of food and culinary preparation; (II) tools to measure the ethics of the culinary preparation; (III) optimization methods of the restaurant menu from operational and ethic perspective.

2.1. Ethics of food and culinary preparation

Lately, the consumers' awareness concerning their own health and their preoccupation concerning the relation between diet and health estate have become a decisive factor of the agro-alimentary production, the domain rapidly reacting at these tendencies, both by innovation and by rediscovering traditional products, characterized by a minimum degree of processing and by the lack of alimentary additives and dyestuffs. The concepts of „healthy food” and „ethic food”, even if well scientifically argued, have not yet been defined by European legislation. But there exists a large consensus concerning the necessity of a legal frame which may protect the consumers and the environment, to promote „clean” agricultural technologies and correct commercial practices and to encourage innovation in food production. We only mention here the *eco sanogenesis* and the *one health* ideas.

At present, the market of healthy food products grows in a sustained rhythm, benefiting of extraordinary visibility due to new technologies of information and globalization phenomenon. Different researches (Azzurra, A., Paola, P., 2009; Jun, J., Kang, J., Arendt, S. V., 2014; Magnusson and others, 2003; Michaelidou and Hassan, 2008) conclude that a better understanding of the decisive factors of the consumers' perception concerning healthy food is the success key in order to orientate and develop this market, to valorize opportunities created by final alimentary research, that radically transform the concept of „food”, by adding to nutritional and sensorial properties an important role on keeping health, psycho-physical well being and on preventing certain diseases.

In this context, for example, in the USA, where obesity is a serious problem of public health (Keith and others, 2006), citizens' interest face to healthy alimentation is larger than ever. Vegetarianism has got popularity too, when noticing the association between this alimentary diet and the reduction of obesity risk, of diabetes and heart diseases, and certain forms of cancer, as well as increase of longevity (Marsh, 2011). Researches have shown consumers' preferences for organic food, strongly correlated with their perception as being benefic for health (Magnusson and others, 2003), as well as with individual ethic behavior (Michaelidou and Hassan, 2008). In culinary production there is

observed the new paradigm of health generating gastronomy (Gruia, R., 2014).

Numerous studies have been dedicated to the research of men's perception concerning the concept of „health value”. Tudoran, Olsen and Dopico (2009) define health value as „the degree in which men value their own health” (quoted by Jun, J., Kang, J., Arendt, S. W., 2014). Smith and Wallston (1992) have enumerated different methods to measure the manner in which men appreciate their health value from the perspective of the competition with other values: wellbeing, strength, personal security, knowledge level or social integration. Maddock and all (1999) have used the concept of „involvement in healthy eating” in order to evaluate its importance in correlation with some demographic characteristics, and Michaelidou and Hassan (2008) have examined the role of „health consciousness” in the forecast of the attitude face to organic food, respectively of the consumption intention.

From marketing perspective, there must be underlined the large heterogeneity of European food market demand, due to regional differences of mark as for the perception of an aliment as being in the healthy category. These ones mainly derive from socio-demographic differences, from the existence of specific food consumption customs, from different national politics in the field of promoting public health, but also from cultural traditions strongly emphasized at regional level. Last years' social and demographic changes, first of all the increase of medium life hope, the added incidence of disease correlated to unhealthy alimentary habits, but also to important progress of scientific knowledge in the field of the interaction between diet and health, have determined the process of transfer of consumers' attention from eliminating substances considered to have a negative influence towards attributes that characterize products in positive terms, such as freshness and natural estate (Azzurra, A., Paola, P., 2009).

During the last decades, there has considerably increased the food consumption outside family environment, the phenomenon being associated to chaotic alimentation and to high consumption of rich in calories food, saturated fats, artificial sweeteners and salt, instead of fruit and vegetable, fiber and vitamin consumption. The directly noticeable tendency, in everyday life, but also remarked in research reports (Feldman, C., 2014; Musiker, J. C., Kesa, H., 2014; Schröder and McEachern, 2005; Stewart, H. and others,

2006) of over dimensioning the portions from restaurant menus and consuming products of „fast food” type is considered one of the causes of obesity phenomenon increase and the growth of diabetes cases, of cardiovascular diseases and of cancer. Although the individual behavior in relation to nutrition is the main academic study direction, there are solid arguments to also add the characteristics of the food consumption environment to the range of traceable causes of obesity and enumerated diseases (Wansink, B., 2004). At the same time, scientific investigations referring to consumers' intention to choose healthy preparations from restaurant menus (Jun, J., Kang, J., Arendt, S. W., 2014) have shown that preparations poor in fats and caloric content influence the consumption behavior, but that the taste of healthy preparations exerts a stronger impact upon the intention to choose them and to recommend them among friends and acquaintances.

Other endogenous variables, whose positive effect upon the choice of healthy preparations from restaurant menus has been observed through scientific analyses, are: nutrition knowledge (Dickson-Spillmann and Siegrist, 2011), the existence of information concerning the nutritional content of culinary preparations in the menu lists (Kozup and others, 2003), the presence of healthy preparations in the menu lists (Longacre and others, 2012, Story and others, 2008), the price of healthy preparations (Horgen and Brownell, 2002, Wall and others, 2006), food consumption habits (de Bruijn, 2010), the perception of the image of our own body, vanity and personal values (O'Mahony B., Hall, J., 2008).

In the context of the paper theme, a special relevance has the tourists' food consumption behavior. During holidays, the relation with food is different from the one in the usual life environment, being temporarily and convivially conditioned. Food interferes in different degrees in tourist experience, from having a pure functional role in relation to the main aim of tourist travel, to the function of strong vector of image and reputation of a tourist destination. For tourists interested in the chosen destination gastronomy, the consumption of local specialties has a symbolic character, it is a confirmation of the relation with the aimed geographic zone, with the local collectivity, with the „terroir”, the „sacralisation” of certain touristic destination being even sustained by the authenticity of traditional culinary attractions (Bessiere and

Tibère, 2012). Tourists have the opportunity to get in touch with regional gastronomic culture, through material elements (dishes, ingredients, serving instrumentation and table ornaments), but also through untouchable components (symbolism of certain preparations, social local values, behavior codes, culinary and crafts know-how).

It is thus shaped the frame of new expectations concerning the development of traditional farms and of organic agriculture², as integrative part of sustainable agriculture, able to respond the current consumers' interest, as it is confirmed by data referring to organic food consumption, which has registered a growth rhythm of at least 15% every year, since 1998-2008³. After the beginning of the 21st century, people demand more, they look for ethic elements, products with reduced emissions of carbon dioxide and with a sustainable ecologic impress, healthy ones, sufficient ones, which should not imply pain to the sacrificed animal in view of meat consumption, that certify correct remuneration of the direct producers' work and poverty elimination, for them the „organic” character being only one of the factors of a more complex equation of consumption intention.

Exploring the problem of food ethics, Richard Norman⁴, Professor Emeritus of moral philosophy at Kent University, Great Britain, observes that ethic treatment of alimentation does not need simple adoption of a certain position concerning food production, distribution and consumption behavior, such as organic agriculture, correct practices on the distribution chain or vegetarianism. *Alimentation ethics* and,

by customization, **menu ethics**, impose to take into consideration all the values implied in food choices and the evaluation of all consequences in production, distribution and consumption of alimentary goods, on long or short term, to weigh up the pros and cons and to decide as for what is morally right.

2.2. *Measuring tools of the ethics of the culinary preparation*

Due to the increase of alimentary consumption outside our house, it becomes opportune to modify the restaurant offer introducing as a priority in menus poor in calories products and healthy and ethic preparations. There thus appears a new provocation: to conceive a new „measuring” of the quality of culinary preparations. There have been elaborated some tools useful in the evaluation of food characteristics. Van Trijp (1995) has developed such a tool, called the *VARSEEK scale* (Mak and others, 2012). Steptoe and others (1995) have created *FCQ* (Food Choice Questionnaire) with nine factors of food quality: health, mood, need, sensorial appeal, natural content, price, control of body weight, familiarity and ethic preoccupation.

Other researchers have concentrated on particular ranges of consumers: Contento and others (1988) have selected very important attributes of food in case of teenagers; O'Mahony and Hall (2007) have identified eight influence factors in case of female persons, aged between 18 and 30 years old. Another notable scale is *HTAS* (Health and Taste Attitude Scales) elaborates by Katariina Roininen in 1999, with 20 attributes referring to health and 18 attributes referring to food taste (Roininen, K., 2001).

All these scales refer to understanding the consumers' choice of food products in any occasion. Kim and others (2011), concentrating on the dimension of food health, have selected the following attributes in order to qualitatively estimate the food health in the restoration system: *options available in the menu for healthy and „light” food, the use of fresh, natural or organic ingredients, the contribution to the body weight control, the methods of culinary preparation, the availability of small helpings and information concerning the nutritional value.*

A reduced number of studies have approached factors that influence the operators' decision in the restoration system, in favor of culinary production based on organic and ethic food. Such papers have aimed to study the perspective of

² Organic agriculture is a production system that sustains soil, ecosystem and men's health. It is based on ecologic processes, on biodiversity and on production cycles adapted to local conditions and not to inputs with adversial effects. Organic agriculture combines tradition, innovation and science for environment benefit and promotes correct relations and high life quality for everybody implied (Azzurra, A., Paola, P., 2009).

³ The 2010 yearly report presented by „Organic Monitor”, company specialised in global market research of sustainable products, available at www.organicmonitor.com. After 2008, though remaining in positive zone, the growth rhythm of this market has diminished, due to the reduction of the purchasing power, consequence of the world economic crises.

⁴ Point of view present on www.foodethicscouncil.org, entitled „What is food ethics?”

restoration executives concerning healthy alimentary alternatives from menus and influence factors upon these decisions.

McDougall and Levesque (2000) structure the quality of a restaurant service in three elements: the quality itself (which is served), quality perception and relational quality (as it is served), that he investigates in relation with clients' satisfaction. The research results have highlighted the preparation quality as an essential variable that determines the clients' satisfaction, while the „healthy” attribute of the preparations improves the perception concerning their quality, therefore, the restaurant one.

2.3. Optimization methods of restaurant menus from operational and ethic perspective

The analysis of the selling mix of culinary preparations from the menu list, widely known as „menu engineering”, is a method elaborated even since the beginning of the '80s (Kasavana and Smith, 1982; Pavesic, 1983, 1985), based on the *Boston Consulting Group matrix*, which suggests that, in order to assure the creation of long term value, a company portfolio must contain both products with a high rhythm of growth, that need financial support, and products with a low rhythm of growths, but which generate income.

The subject hereinafter enjoyed attention during the last decade of the past century, when the method was brought a series of modifications, elaborating improved models: *the Pavesic model, the Hayes and Huffman model, the LeBruto, Quain and Ashley model, the Cohen, Mesika and Schwartz model, the Bayou and Bennett model or the Horton model* (Taylor, J. J., Brown, D. M., 2007), remaining a methodology applied by restoration practitioners all over the world during the last years too, upon which there are also concentrated academic researches (Kwong, 2005).

Cohen, Ghiselli and Schwartz (2006) sustain that a direct adaptation of a method of analysis from the world of corporation product mix to a restaurant menu might be inadequate, leading to allocation of resources and decisions of under optimal prioritization. A major weakness of the menu product portfolio model, identified by the paper's authors, is the hypotheses of the product independence. The managerial decisions, adopted after applying the method of analysis of the sold product mix, are based on the presumption that to reassign resources and prioritize them will have

an impact not only upon the aimed product, which, in fact, is not.

The paper presents in detail, starting from the economic theory and from the theory of the consumer's behavior, four fundamental theoretic reasons which contradict the hypothesis of the product independence in the menu: (a) the *relations of complementarities* between the products existing in different categories in the menu list (preparations and drinks, for ex.) and the *relations of substitution* between the products to be found in the same category in the menu list (desserts, for ex., because it is unlikely that a client who has chosen a certain preparation from the dessert category would choose another one, during the same meal); (b) the *selection* of ordered products by clients is made by price comparison and their quality; (c) the widely used *appeal product strategy*, deliberately commercialized at a small price, in order to attract clients to also consume other products from the menu that generate high profits, by definition contradicts the hypothesis of the product independence; (d) *the production costs* of a preparation may depend on other preparations offered by the restaurant, as is the case of the price reduction at acquisition offered to contractors for large volumes or the use of parts, remained after processing certain preparations, in order to prepare other ones, which may affect the position of the respective preparations in the product portfolio matrix.

3. Research methodology

In order to achieve the objective of this paper, the research methodology comprised **two modules**:

- To get valid and relevant information from secondary data sources about the Romanian consumers' behavior in relation with ethic alimentation, respectively to collect and analyze primary qualitative data referring to the availability of the operators from Brasov hospitality sector to introduce in their menus culinary preparations from the gamut of ethic alimentary products, in order to form a sample and to apply a questionnaire;
- To collect data concerning the sales of culinary preparations from the menu list of a well known in Brasov restaurant and to apply the multidimensional analysis method in order to examine the preparation mix in function of the influence of several factors, among which the menu ethic too.

Data concerning the Romanian consumers behavior in relation with ethic alimentation have been got from information given made public by Unilever Food Solutions and Planet Retail companies, from press bulletins of professional and employers' associations from the field and of other interested parts, and, in order to observe the operators' availability from Brasov restaurants to promote ethic food in menus, there has been used the *interview method* with 20 restaurant managers. The interviews have been made (Florescu, G., who is part of a probationers' group in the hospitality system from the Braşov tourist region), by monitoring specialists from the Faculty of Alimentation and Tourism from *Transilvania University of Braşov*.

The restaurants included in the sample, some of them independent, others integrated in hotels from the Braşov tourist region, have been selected after four criteria: (a) the position in the local restoration system, (b) tradition and perspectives, (c) specific of the menu and (d) history of the institutional collaboration (with the Faculty of Alimentation and Tourism and with the Association for Promotion and Development of Braşov Tourism).

The multidimensional analysis does NOT start from the hypothesis of product independence in the restaurant menu. That is the reason why it was used to create a menu analysis model that includes the criterion of the ethics of the products from the list. The data collection has been made within a classical restaurant of tourist destination from Braşov, obtaining data referring to: the food cost, the markup of menu items and the number of preparations sold for seventeen menu items during a certain period of time.

The analysis has been achieved on the bases of the *multidimensional analysis* method, by adapting solutions proposed by Cohen, Ghiselli and Schwartz (2006) that allow examining the mix of preparations from the menu in function of the influence of several factors. Instead of a point in a plan, there is used a polygon in a two dimension space, for a visual representation of the profile of every preparation from the analyzed category.

The study has a geographically limited character, as the responding sample is limited only to managers from restaurants of Braşov tourist destination, and also due to the fact that it has not been elaborated after standard statistic criteria. Moreover, the limits of the study are given by the particularization of the multidimensional analysis method at examining the influence of four factors on menu components.

4. Results and discussions

From what has been presented there can be observed the idea that **ethic foods** are in fact products that summarize new qualities, linked to the ensemble of norms with which a human group (consumers) regulate their behavior, in order to distinguish what is legitimate and acceptable in achieving culinary preparations and menus, as for example aspects concerning products technology, biology, ecology, etiology, ergonomics and economy, as well as the right appreciation of the production manner and of the producer.

4.1. Restaurant consumers and operators in relation with ethic alimentation

The work technique is based on a sample (that has not been established after statistic rules), and the results must be taken into consideration in a limited manner, having only indicative value concerning the practices from the Braşov restoration sector. The data collecting procedure consisted in face-to-face discussions and in telephone interviews that went on between June and November 2015.

The interviewed could give answers in several stages and have been advised to describe and use their own acceptance concerning organic and ethic food. The participants were guaranteed identity and answer confidentiality. The obtained data have been systematized, in function of inhibitory or favoring influence upon ethic food consumption, in table 1.

Table 1. Consumers' behavior in relation with ethic alimentation

No.	FIELD	INHIBITIVE FACTORS	FAVORING FACTORS
1.	Consumption behavior	- the public is too little informed about healthy food benefits and about the meaning of ethic food; - among Romanian consumers there are deep preconceived ideas, that make a lot of them	- a larger and larger number of restaurant clients become more and more attentive at what they are consuming, being interested in the content of culinary preparations,

		not take seriously organic alimentation or ethic behavior of alimentary consumption;	but also in the origin zone and the processing manner, reason for which operators' transparency has become very important;
2.	Ethic food perception	<ul style="list-style-type: none"> - the ones eating in town consider that healthy food from menus does not seem appetizing, nourishing and it is expensive, but they would like nevertheless to have more healthy options at their disposal; - food producers alter basic product, so that even food considered healthy isn't healthy any more; - the more processed an aliment is, less healthy it is, a good product being one with a shorter list of ingredients and adds; 	- a tendency that expanded lately is the one of „X.-free” food category, i.e. products that do not contain one or more ingredients that may harm a category of consumers with different sensibilities, such as gluten, lactose or other allergens;
3.	Culinary production	<ul style="list-style-type: none"> - Romanian cuisine is a „heavy” cuisine, with almost everything boiled or fried, with dangerous combinations of potatoes, meat and farinaceous products; - many restaurants confront themselves with the problem of extremely limited depositing spaces, with the necessity to respect demands concerning the temperature and humidity control; - fruit and vegetables short term of preservation in fresh estate; 	- despite difficult economic conditions, the consumers look for preparations with which they may spoil themselves, they remain attentive at quality, but also at the price they are disposed to pay for culinary pleasures. As a response, the Horeca operators offer craft preparations, „home” prepared, organic ones and of the „fair-trade” type, that promote local agriculture, as a sustaining mode of regional economy, but also as an ecologic initiative, of reduction of carbon emissions associated with transportation, the good treatment of sacrificed animals and other ethic aspects;
4.	Marketing and promotion	- the quantity of visual, olfactory and auditory stimuli, at which the public is daily subject;	- Price reduction, taste improvement and healthy food highlighting through the graphic of the menu list encourage their selection by consumers;
5.	Restaurant management and assuring economic sustainability	<ul style="list-style-type: none"> - health and nutrition problems, as well as social responsibility are considered by restaurant managers as less important than the volume of sells, profit, insufficient demand, legislation concerning food safety and quantitative and qualitative deficit of labor force; - most of the restaurant managers state that they will not add new preparations in the menu lists, except for the ones they are convinced basic clients will accept and they will directly contribute to the growth of sales and profits; - healthy alimentation is a niche one; there are cases of restaurants that axed themselves on raw food and bankrupted; - the managers consider that fruit and vegetables are very perishable and should be rapidly consumed, if not resulting large amounts of wastes, which diminishes the potential profit; - certain restaurants consider that fresh 	<ul style="list-style-type: none"> - fast-food restaurant managers have appreciated that their clients are rather inclined to accept menu modifications, in comparison with the managers of full service restaurants ; - Preparations based on vegetables and fruit benefit of the advantage of the simplicity of recipe and process of culinary preparation;

		product seasonality is not compatible with menu consistence and predictability; - the high risk concerning the volume of sales of healthy food has been presented as a resistance factor in their inclusion in menus by many restaurant representatives;	
6.	Tendencies of local market of ethic food	- many operators have observed that clients serving the meal at a restaurant are more clement with themselves, offering to themselves the liberty to order what they like, without taking into consideration restrictions. That is why restaurant managers do not estimate they will have a significant demand for healthy food in the future; - even if caloric contribution is posted for every dish, the clients do not take them into account and they very rarely consider them;	- restaurant operators expect that, in the future, their menu include more innovative preparations, fresh ones, with original flavors and condiments; - the offer of healthy preparations in restaurants will slowly increase, while compromise preparations will go on selling well; - Fruit and vegetables constitute an instrument to offer the clients creative food, with original flavors;

4.2. Optimization of the menu through multidimensional analysis

For this aim, there have been considered the following 4 factors: (a) preparation popularity; (b) food cost; (c) menu item markup ; (d) menu item ethics.

Thus, to each preparation it is associated a quadrangle, and its area represents the preparation general profile. In the analyzed case, the area equals the diagonal semi product, having in view that the diagonals are perpendicular. In an expanded case, in which there are selected several factors in order to characterize every preparation, the area of the resultant quadrangle is determined by decomposing the polygon in triangles. *The larger the quadrangle area is the better the preparation performance is, in function of the chosen attributes.* All attributes are normalized using a predetermined scale [0..10]. In case of attributes for which reduced values are associated to a better performance, the normalized value of i attribute of j preparation is given by the relations:

$$Z_{ij} = \frac{Max_i - V_{ij}}{R_i} \times 10$$

$$R_i = Max_i - Min_i$$

where:

V_{ij} – value of i attribute in case of j preparation

Max_i – the largest value of i attribute, taking into consideration all the preparations from the analyzed category

Min_i – the smallest value of the i attribute, taking into consideration all the preparations from the analyzed category

R_i – dimension of the interval between the largest value of i attribute and its smallest value, taking into consideration all the preparations from the analyzed category.

In case of attributes for which larger values are associated to better performances, the normalized value of i attribute of j preparation is given by the relation:

$$Z_{ij} = \frac{V_{ij} - Min_i}{R_i} \times 10$$

The normalized values of appreciation factors of preparation performance and the profile form of the selected preparations for comments is presented in [table 2.](#)

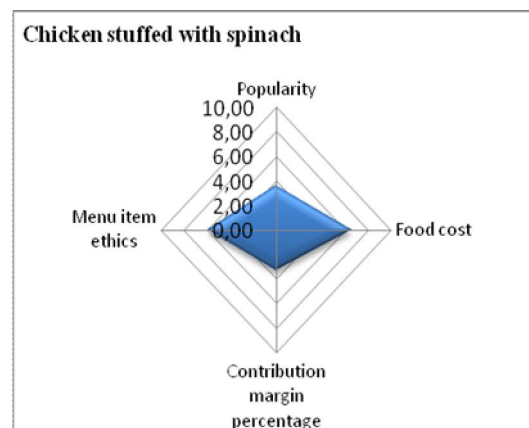
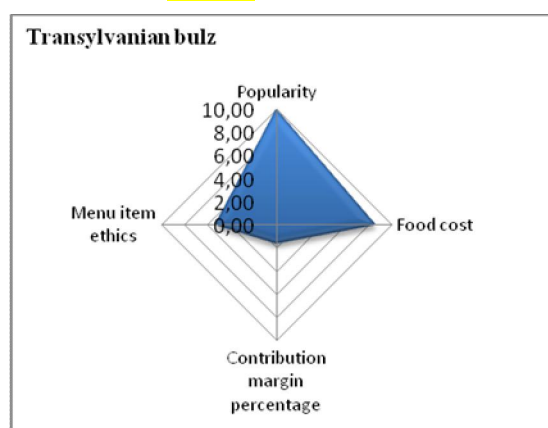
Table 2. Normalized values of the appreciation factors of the restaurant's menu items

Menu item	Analyzed factors				General profile of the menu item	Menu item ranking
	Popularity (a)	Food cost (b)	Menu item markup (c)	Menu item ethics (d)		
Sachsische smoked knuckle	1,72	0,00	10,00	0,90	5,28	17
Spare ribs with barbecue sauce	6,55	3,55	2,78	1,00	36,02	11

Steamed transylvanian rolled cabbage	6,47	4,77	1,62	1,70	37,77	10
Roasted duck leg	1,97	4,17	3,92	2,90	45,37	8
Chicken stuffed with spinach	3,61	6,57	3,31	5,90	75,75	2
Carp brine with polenta	1,43	4,00	4,13	3,50	45,59	6
Crusted pork ham with black beer sauce	0,00	3,83	1,13	1,30	9,39	16
Moldavian stew	3,45	4,78	2,85	4,30	49,07	5
Transylvanian croquettes	3,11	8,24	1,03	1,50	32,82	13
Dracula's cold platter	1,18	4,70	5,79	2,40	65,51	3
Rustic chicken stew	4,71	7,28	1,77	3,50	54,20	4
Transylvanian bulz (polenta ball with sheep cheese)	10,00	8,63	1,62	5,30	101,83	1
Baked potato with tzatziky sauce	3,36	10,00	0,00	10,00	33,61	12
Trout with spices	2,10	5,55	1,82	8,42	42,49	9
Greek Salad	3,45	6,52	1,32	7,12	45,48	7
Celery salad	1,26	8,92	0,46	8,50	21,19	14
Stuffed eggplant	0,17	7,64	0,63	8,90	13,76	15

In order to adopt decisions concerning the content of the menu item ranking, using the *multidimensional analysis method*, first of all there are classified preparations in function of the size of the area of the associated quadrangle – the last column from [table 1](#).

In this study, where there are defined four factors of influence, the ideal form is an equilateral quadrangle, with an as large as possible area (fig.1).



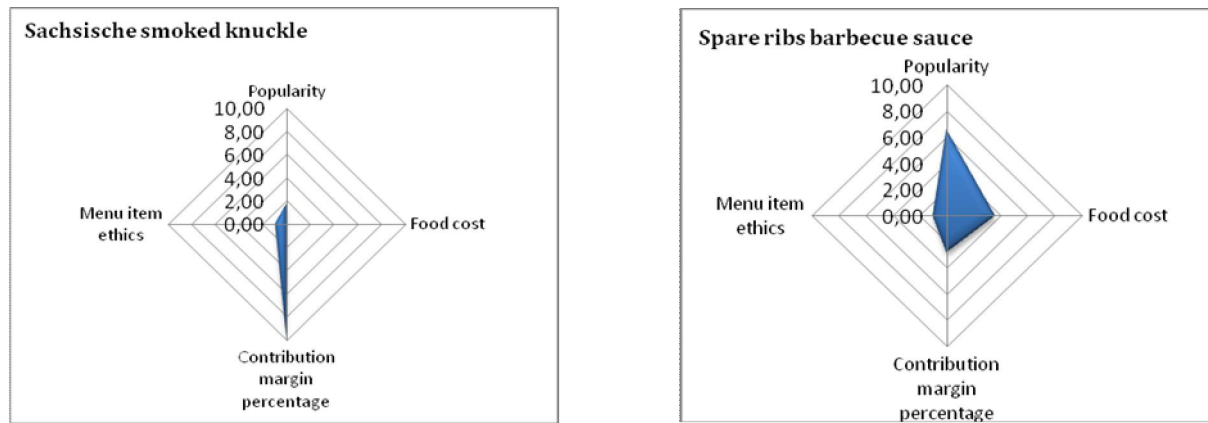


Fig.1. *Appreciation of the general profile of the preparation from the menu*
N.B. – the increase in size of the quadrangle surface indicates a better performance of the preparation, in function of chosen criteria.

In the case study, the desired conditions are mostly fulfilled by the *Transylvanian bulz (polenta ball)* and by the *chicken stuffed with spinach*.

The next step consists of the analysis of weaknesses and strong points of every preparation. This demarche is made by visual examination of the preparation profile, i.e. of the diagonal dimensions on each ax that defines the profile. In case of *Transylvanian bulz*, the contribution margin percentage is not satisfactory, therefore the decisions referring to this preparation will aim to reduce the cost with raw material, by reducing the quantity of „burduf” cheese and polenta (helping reduction) and maintaining the selling price, solution that will lead to the improvement of the preparation ethic index, due to the reduction of the quantity of saturated fats.

Another possible solution is to assue risks implied in a price increase, which may be minimized by using subliminal messages: a more favorable repositioning of the preparation in the menu list, its highlight with graphic elements, creative description and other techniques that take into account the menu psychology.

On the other hand, the *Sachsische smoked knuckle* has the weakest profile, the only factor that ideally toggles it being the contribution margin percentage. That is why the restaurant manager will take the decision to eliminate this preparation from the restaurant menu list and to replace it with another one, about which there are expectations to enjoy popularity, it has a simple process of preparation and a reasonable contribution margin percentage, it is tasteful and, at the same time, it has ethic qualities.

It is important to mention that the taken decision will not directly lead to the modification of the profile of other preparations from the list, because the determining factors of every preparation profile are established in the basis of normalized values.

More than this, every preparation may be compared with itself at different time moments, in order to observe the effect of decisions adopted previously. Another advantage is the one that preparations may be analyzed view several influence factors at the same time. The fact that information may be presented in a visual form too, relatively easy to be interpreted, on a graphic of „radar” type, is another advantage not at all to be neglected of this analysis method of the menu.

The menu analysis at different moments may highlight modifications of the profile shape of certain preparations that put into evidence certain tendencies of their repositioning in the classification, in function of the viewed factors.

This characteristic of the multidimensional analysis may be put into value when the restaurant applies the „*appeal preparation*” strategy, in order to attract clients. The strategy consists of adding in the menu item a preparation with an average-high price of the raw material, but relatively simple to prepare, whose price is established on the bases of a minimal contribution margin percentage. The restaurant manager expectation is that the appeal preparation attracts new clients in the restaurant, and the total sells significantly grow, considering the dependence of the preparations from the menu list; clients will choose the appeal preparation from its group (for ex. the entree group), but will also order other products from the list (desserts, drinks etc.) that have a high

markup, which will lead to the growth of the restaurant profit.

The menu optimization method presented in this paper, based on the multidimensional analysis, has an unprecedented character and the merit that, on one hand, it facilitates the analysis of the products from a restaurant menu list after reasonable criteria, offering a logic support in order to adopt decisions concerning the menu management and, on the other hand, it allows to select products from the menu that gather the dual aim to generate profit expected by restaurant operators and to promote the sale of ethic food.

The method may constitute an efficient and enough simple tool, at the disposal of restaurant managers that may be successfully used in attaining certain short term objectives: the growth of the profit, the cost reduction, the increase of clients' satisfaction, including the promotion of ethic culinary food and the increase of the market quota.

The introduction in the equation of the decision concerning the content of the restaurant menu list of the „preparation ethics” factor is useful for the achievement of restaurant long term objectives: positive perception of the restaurant quality by consuming public, development of mutually beneficial relations with suppliers, consolidation of the market position, affirmation of social responsibility as image vector, growth of productivity and employers' attachment face to the restaurant brand.

In our opinion, until now there wasn't given due importance to the problems of operators' ethic behavior in the hospitality system, of detection of the factors that influence it, as well as of the responsibility of the academia to offer restoration practitioners analysis and decision instruments in order to attain this objective.

Primary and secondary data systematically presented in the previous chapter set, for the first time, an image of the behavior and attitude of restaurant clients, tourists or residents, respectively of the operators from the Braşov hospitality system face to ethic alimentation.

The introduction of new technologies must be achieved in parallel with classical menus, not to create a discomfort feeling in the clients that are not familiar with electronic devices, as it was highlighted in most of the studies dealing with this theme (Hsu and Wu, 2013).

There may be deduced from here that restaurant strategy may include the implementation of the concept of „menu ethics” at the same time with the introduction of digital menu list, both having

a substantial role in a honest and transparent communication with the clients.

Business in hospitality system is build in order to offer what the clients want to buy, and the restaurant managers do not consider that it is their responsibility to increase the demand of healthy and ethic preparations. Although this point of view is at least to be discussed, to the challenge to improve the consumption behavior of restaurant clients must be found solutions also by other interested parts, as the government, nonprofit associations from the public health field, educational institutions and specialists in nutrition.

There would be opportune to implement government policies that offer restaurants competitive advantages in case consumers are offered more healthy options in menu items, following the experience of the USA and other several European countries that permanently adapt legislation in order to diminish risks associated to unhealthy food. U.E. regulations aim to fight obesity among children, considered an extremely vulnerable category at advertisement for junk-food products. In Romania, since 2011, The Health Ministry has announced the intention to introduce the so-called fast-food tax for unhealthy food, which hasn't been put across up to now.

The private environment has proved to be more perceptive: by signing „*The ethic code for publicity addressed to children*”, the Coca Cola, Star Foods, Nestlé, Burger King, Ferrero, Mars, Kraft and Unilever companies have assumed to stop commercial advertisement for hypo caloric food products, with high fat, sugar and salt content, addressed to children under 12, as well as promotion campaigns of fast-food products in primary schools. Institutional programs in the alimentary field that encourage public to opt for organic and functional preparations from menus could contribute to the reduction of dissimilitude and the counteraction of remarked tendencies that for poorer populations there may be more accessible unhealthy food.

The present study discloses that, in the selection of culinary preparations from menus, the consumers give priority to taste, confirming the conclusions of the majority of researches on this theme (Jun, J., Kang, J., Arendt, S. W., 2014, Feldman, C., 2014; Musiker, J. C., Kesa, H., 2014; Azzurra, A., Paola, P., 2009, Schröder și McEachern, 2005; Stewart, H. and others, 2006, Kim and others 2011). People want to eat tasty and healthy food in the same time, but they are

often put in the situation to opt for one or another, when they eat in a restaurant. This aspect, observed within our investigation, may be turned to profit in the restaurant marketing strategy dedicated to menu that should not limit itself to present nutritive characteristics of preparations, but emphasizes tasteful qualities of foods to which the „ethic” attribute is associated.

But it is essential that specialists in culinary art should demonstrate that health and taste may coexist, at an accessible price, and here an important role plays the higher education, that should respond to this market request by preparing specialists with specific nutrition and gastronomy knowledge, able to build reputation by achieving innovative preparations, as for example ones based on fruit and vegetables, both delicious and nutritive.

Fruit and vegetable producers, farmers have the opportunity to develop products that are directly addressed to the commercial alimentation system, taking into account losses, the facility of being used in culinary sector and the necessity to assure a constant quality along the most part of the year.

A concentrated farmers', food industry and specialists' effort in the health field in order to develop projects of healthy and ethic products, especially aimed to the hospitality system – prepacked to reduce perishability, brought in a certain preparation stage for the growth of work productivity in kitchens and optimal utilization of depositing spaces – would eliminate many barriers met when using these products in restaurants. It is as reasonable as possible that operators from restoration system get food ingredients from immediate neighborhood, from local suppliers, every time it is possible, to guarantee preparation freshness. On the other hand, the more visible becomes the environment degradation, menacing all people's wellness, the number of „green” consumers increases, and this tendency constitutes an important message addressed to practitioners in restoration, according to which healthy and ethic alimentation is not a bauble that will be shortly abandoned, but a main trend of the near and farther future.

The paper constitutes an important step in understanding obstacles in the promotion of organic and functional alimentation in the restoration system and offers operators in hospitality an easy and efficient modality of menu management, taking into account the tendency of growth of the demand of ethic food products, and, in the selection of culinary

preparations from menus, even if consumers offer priority to taste, gastronomy technologists may make it possible that health and taste coexist, at an accessible price.

5. Conclusions

As very few researches have approached the subject of positive correlation between the education level and the possibility to select healthy and ethic food from menu items, correlated with the populations' reduced degree of education concerning the principles of a balanced alimentation, it is observed that, both among consumers, and among operators in restoration, the notions of „organic food”, „functional food” or „ethic food” are almost unknown.

Ethic foods are the products that totalize new qualities linked to the total of norms with which a consumers regulate their behavior, in order to detect what is legitimate and acceptable in achieving culinary preparations and menus, as, for example, aspects concerning products technology, biology, ecology, etiology, ergonomics and economy, as well as the right appreciation of the production manner and of the producer.

The most important criterion after which is appreciated the activity of restaurant managers is the volume of obtained profit, which shows their reticence face to the growth of the number of ethic preparations in the menu items, explicable by the perception of a weak volume of sales, of an inconstant quality and the seasonality of the availability of fresh raw materials, of the risk of a higher level of technologic losses and the necessity of larger depositing spaces, provided with control equipment of temperature and humidity.

The insufficiency of graphic space for listing preparations and informing referring to their ethic attributes may be surmounted by replacing menu lists on paper support with digital menu lists, which should not limit to the presentation of preparation nutritive characteristics, but emphasizes the food tasteful qualities, the price etc., to which the „ethic” attribute is associated.

The restaurant marketing strategy dedicated to menus, the introduction of new technologies should be achieved in parallel with classic menus, not to create a discomfort feeling to the clients not familiarized with electronic devices, so that in the restoration system there may be included the implementation of the „menu ethics”

concept at the same time with the introduction of digital menu lists, both playing a substantial role in a honest and transparent communication with clients.

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THE LABEL OF ORGANIC PRODUCTS - MEANS OF PROMOTING. EUROPEAN AND NATIONAL REGULATORY FRAMEWORK

L. MANEA *

Abstract: *The paper compares the European legislative framework with the national Legislation, capturing objectives, principles and rules of the organic agriculture system (processing, labeling, marketing and promotion, inspection and certification). In this paper, both studies on organic products and their labeling have been used, as well as analysis of statistical data from EUROSTAT and MARD on the number of operators and certified organic acreage in organic system in EU Member States and in Romania. It has been found both in the EU Regulations, as well as in the national rules on labeling of organic products that there are precise formulations, that measures aimed to increase consumers' confidence in organic products, as products produced and certified according to strict rules of production, processing, promotion, survey and certification. Thus, labeling and mandatory labeling rules ensure the identification of the product, the rapid and simple information of consumers and the promotion of products on the market.*

Keywords: *organic agriculture, organic products, labeling, promotion, certified organic operators, consumer, certification bodies*

1. Introduction

The organic market is a growing market, for both at international and European level and in Romania, the areas cultivated in the organic system are increasing, the number of certified organic operators is on the increase, the consumption of organic products is also growing, without this still being the characteristic of the countries with high GDP level per capita.

Regardless of the terminology used to refer to the agriculture which, by the technologies used respects nature and pursues the closeness to nature and the natural physiological processes regarding products, the European legislation encourages and supports the development of organic farming (term used mainly in the Anglo-Saxon territory) or organic farming (term used mainly in the French-German space) - EC Regulation no. 834/2007 on organic production and labeling of organic products and EC Regulation no. 889/2008 laying down detailed rules for the implementation of Council Regulation EC No. 834/2007).

Romania has adopted, in turn, rules for the application of the Community rules on the organization of inspection and certification system in organic farming - the Ministry of Agriculture and Rural Development Order no.181 / 2012 published in the Official Gazette

no. 613 / 27.08.2012, but also the rules regarding the measures and sanctions required in order to comply with the provisions of the European legislation on organic production and labeling of organic products - Emergency Ordinance no.34 / 2000 on organic foods and Government Decision no.131 / 2013.

The legal norms regulate the whole system of organic farming, from defining the production method on crop production, livestock and aquaculture sectors to the establishment of rules for the processing, labeling and marketing of the organic products. Also, guaranteeing the quality and the degree of authenticity of the organic products is ensured via certifying the producers by the national competent inspection and certification body, certification that will be made public on the product label as a safety measure that product is obtained in accordance with strict production, processing, inspection and certification rules.

2. The evolution of organic farming in Romania

If in the United States and Australia, the green agriculture arose from physical needs related to soil protection and as an alternative to processed food of poor quality, organic farming in the twentieth century Europe occurred due to the

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illnesses caused by the food carrying pollutants produced by intensive type technologies.

The development trend of organic agriculture continued in the first decade of the XXI century, along with the trend of increasing the acreage in organic system. The same increasing trend was felt in Romania, a country which in 2010 was ranked 26th in a total of 84 countries with an agricultural area of 182,706 ha in the organic system, and 53rd when it comes to the share of cultivated area in organic system from the total agricultural area.

The pace of organic farming development in Romania has kept its upward trend, so that at the end of 2012 the area of land under cultivation in organic system rose to 288,261 ha., and in 2013 to 301,148 ha.

However, the pace of organic farming development in Romania is still low when relating the area under organic cultivation to the total agricultural area, according to MARD statistics in 2014 (Fig. 1 and Table 1) and compared to the situation in other EU countries.

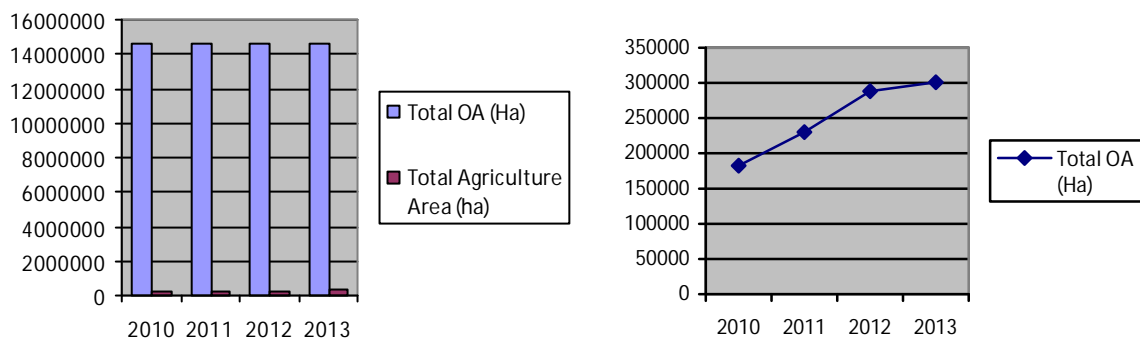


Fig.1. Evolution of ecological agricultural areas in Romania

Table 1 The share of organic farming areas the total of agricultural area

INDICATOR	2010	2011	2012	2013
Total OA (ha.)	182706	229946	288261	301148
Total Agricultural Area (ha.)	14.634.436	14.621.427	14.615.057	14624081
Share (%)	1.25%	1.58%	1.98%	2.06%

Table 2 The evolution of the number of operators certified in organic farming in the EU Member States

EU Member State	2009	2010	2011	2012	2013
Poland	14896	17092	20578	23430	25281
Italy	45221	44371	43029	41807	40562
Spain	21237	25291	27877	32063	34159
Germany	19813	21047	21942	22506	23014
Romania	3078	3155	9713	15544	15194

Source: Eurostat

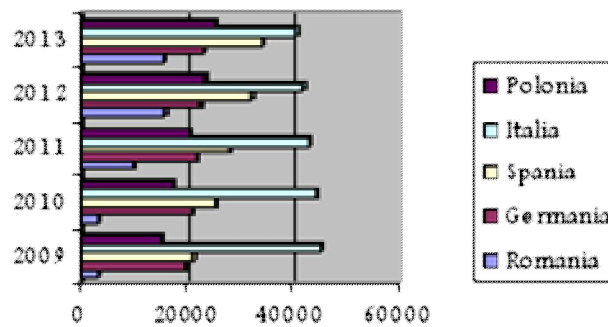


Fig.2. The evolution of the number of registered operators in organic farming in UE 2009-2013

Another indicator of the positive development of organic farming in the XXI century Romania is the number of operators active in agriculture certified as operators of organic products after the completion of legal proceedings.

Even if the growth is spectacular in 2009-2013 regarding the agricultural operators certified as registered operators in organic farming (Fig.2), ascertaining in 2013 increases five times higher than in 2009, it should be noted that most Romanian operators certified are small farms, with land area between three and twenty acres, for which their strength in penetrating the market is low, and keeping them on the market is threatened by the imports of organic agricultural products from the European Union.

Increasing the number of operators certified in organic farming in the interval 2009-2013 was due to the existing support measures for the conversion period granted under art. 68 of *the Regulation (EC) no. 73/2009 laying common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers*.

The information regarding the quality of producer or processor certified in organic farming is found on the product label, which increases the consumer's confidence in the product and implicitly, in its manufacturer.

The domestic consumption of organic products is low in Romania, on the one hand due to the low purchasing power of the average Romanian consumer compared to the high price of an organic product compared to a conventional one, due to the higher costs of production, preservation, packaging and the specific storage conditions. Other factors that determine the low level of domestic consumption of organic products are the small number of local processors certified in the ecological system, because most

certified local operators are the local farmers, those offering the organic raw material, on the one hand, and on the other hand the massive imports of organic products supported by the hypermarkets.

Thus, the import organic products have a retail price lower than the production price of local organic products due to the fiscal and agricultural policies to encourage the agriculture and the organic production in central and western Europe.

The upward trend of domestic organic food products and their export is supported by 70-80%, thereby increasing the foreign market.

3. Identifying the origin of products and informing the consumers by means of the label

Under EU rules, Article 2 letter k of EC Regulation No.834 / 2007 on organic production and labeling of organic products, the notion of labeling includes any terms, words, mentions, particulars, particular or commerce trademarks, pictures or symbols on any packaging, document, notice, label, board, ring or collar accompanying or referring to a product.

In this regard, the text of the Regulation expressly provides that labeling is a representation made for the public, distinct from the promotion of the product solely for sale, the main role of the label being to provide the consumer information about the product itself, about its component parts, manufacturer, distributor, where appropriate, characteristics and product quality.

Summarizing the role and purpose of labeling, we can define labeling as a means of identifying products through features, name and origin, brief and rapid means of information for the average

consumer, means of educating the consumer in order to channel the consumption towards healthy products, means of facilitating the commercial operations (the price tags containing modern system of pricing on the barcodes) and means of promoting the product on the market by imposing their own label, using in the process of individuation of the product an established brand name or a protected name.

Regarding a product label on the whole, we should mention that both the graphic and the descriptive part of the product must induce the consumer certain sensory stimuli which will determine his/her consumption behaviour. Regarding the label, sociological studies, but also the marketing ones revealed that a product presentation concerning its provenance from a mountainous area provides an official denomination of the mountain products, while increasing consumer confidence in the quality and origin of the product purchased.

Even the element of a higher price of an organic product originating from a mountainous area will not change the trend of buying that product associated to the area of origin, so identifying the origin of the product on the label in a mountainous area will increase the consumer's confidence in that product, bringing forth its acquisition.

And because in the marketing studies necessary in order to test the market, an aspect considered is the sex of the usual buyer, it has been proven that the food products with indications of origin in a mountainous area are purchased by elder female consumers .

Following the behavioral study of the ordinary consumers, the marketing policies encourage the use of attractive, innovative labels, and with additional information about the product qualities even in case of food products, so viewing the graphics of the label, the consumer can easily identify the product, influencing the buying behaviour .

Speaking of organic products, the protected quality systems of agricultural and food products should be mentioned (**PGI** - 'Protected Geographical Indication' **DPO** - 'Designation of Protected Origin', and **GTS** - 'Guaranteed Traditional Specialty') is a way of recognizing the quality of food products which have a sensory characteristic influenced by the geographical area and provides the producers with the appropriate tools to identify and promote those products whose characteristics are protected at national and European level. The fact that a food product

is protected by a European quality system is highlighted by the specific logo found on the product label.

4. The mandatory legal elements on the labels of the organic products

The provisions on **labeling of the products from organic farming** laid down in the Council Regulation (EC) no. 834/2007 on organic production and labeling of organic products and Regulation (EC) no. 889/2008 laying down detailed rules for implementing Council Regulation (EC) no. 834/2007 are very specific and aim to provide the complete trust of consumers in organic products as products obtained and certified according to strict production, processing, inspection and certification rules.

Although the label is inextricably linked to the product packaging, the particulars contained on the label are clearly established by the legal norms, for there are minimal elements that must be mentioned on the label, governed by the style requirements concerning writing, so that the information in it is easily legible and visible .

For a manufacturer or processor to be able to make mentions on the label regarding the organic product quality, s/he must undergo a prior procedure of certification of the crop term, in case of farmers, and of own certification as organic farmers, and in the case of processors in the food industry, these should be certified concerning the quality of manufacturing procedures used and the products used in processing should only be of organic origin.

The certification is granted by the national inspection and certification bodies competent under the law and accredited by the Romanian Accreditation Association or other equivalent accreditation body in the European Union, signer of the Multilateral Recognition Arrangement of European Accreditation (EA-MLA) and recognized by the Ministry of Agriculture and Rural Development. The National Authority for Consumer Protection is the body responsible with the control on the Romanian market of labeling and use of the Community and / or national logo.

The national logo is the national symbol appearing on the labels of Romanian agricultural or food products which are marketed under a name registered in the National Register of Quality Systems, reassuring the consumers that this product is environmentally friendly.

In the European Union and Romania, the standards for "bio"(organic) agricultural products are established by law and the misuse of words "organic", "bio" or "ecological" is forbidden. For the products certified "organic", distinct logos were established, easily recognizable by consumers. From 1 July 2010 the new European logo has been launched (Figure 3), which is required to appear on the labels sold in the European Union, being used simultaneously with the national logos of the Member States, providing recognition of certified organic products throughout the European Union.



Fig.3. Community logo for organic products

With the use of EU Community logo, the place of production of the agricultural raw materials must be indicated, indication which takes the form: 'EU', 'non - EU' or / EU and Member State or outside the EU, where the product or its raw materials were obtained.

Whenever it is used on a product label, the EU organic logo is accompanied by the code number of the control body or authority on which the operator who performed the most recent production or preparation operation on the product depends on. The general format of the code is AB-CDE-999, where AB is the ISO code of the country of inspection, CDE is a term which links to the organic production, such as "bio" or "org" or "eco" and 999 is a reference number.

The EU member states assigned a code number to each body and each control authority of organic products that have received approval to carry out their activities on their territory. The number of code should be on every label of an organic product, because the code is a security element that the product the consumer is buying has been inspected by the control body or authority, which guarantees that it was produced or processed in accordance with the requirements of the EU Regulation on organic production (Government Ordinance no.29 / 2014 for the

amendment of Government Emergency Ordinance no.34 / 2000 on organic foods).

On the label of an organic product, the following entries are mandatory, as a guarantee of the ecological quality of the product: reference to the organic production, the logos, national and / or European, the name and the code of the inspection and certification body which carried out the inspection and issued the certificate of organic product. In addition to these claims, references on the ingredients / content and manufacturing procedures are other elements that ensure the environmental quality of the product, elements depending on which the inspection of the certification body is carried out.

5. Conclusion

In the XXI century consumer society, organic agriculture products provide numerous health benefits to the human body as witnessed by statistics showing that the organic products contain at least 50% more vitamins, minerals, enzymes and phytoelements compared to the conventional agriculture products, given that chromium as a deficient micronutrient in our current diet is found in concentrations of 78% more in organic food, and selenium has a concentration level 400% higher in organic foods.

Referring to the labels bearing the national marking and the Community logo for organic products, the consumers who buy organic products can trust that at least 95% of the product's ingredients have been obtained in accordance with the organic production method, in compliance to the organic production rules. From the presentation of the product composition on the label, the consumer obtains information on the nutritional quality of the product. In addition, the label shall contain the name of the manufacturer, processor or distributor and the name or code of the inspection and certification body, another element of authenticity and origin of the organic product.

The label is ideal for the product promotion, because in addition to the mandatory minimum information that the manufacturer must indicate on the label of the organic product, in a concise and to the point form, accompanied by suggestive images which may enhance the taste or colour of the product, the label provides information on the region of origin, about the quality of the

ingredients and product characteristics offering singularity to the product and individualizing it in the customer's choice.

According to the terminology used in the national law, the mentioning on the label regarding the ecological quality of the product overall is made by the existence of one of the following logos (Figure 4) :

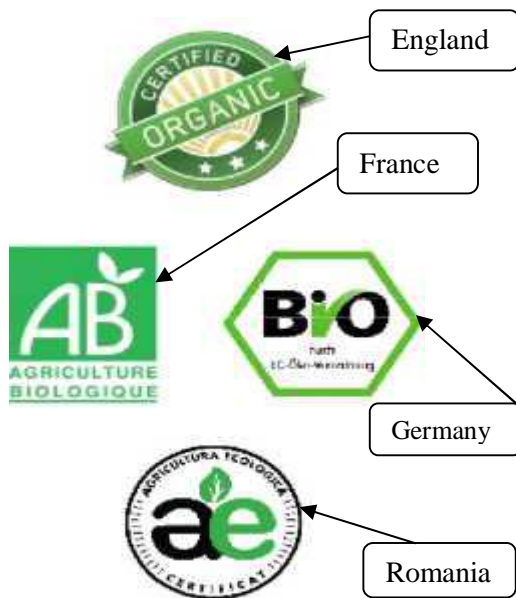


Fig.4. UE Logos

In order to certify the organic origin, the organic food labels must also contain clearly the word "ecological", "bio" or "organic" .

The organic products are products having a local competitive advantage on the European market due to the following factors:

- The number of registered operators in the organic agricultural sector is still growing, the growth trend being felt in the certification of local processors.
- The area cultivated and certified in organic farming grows every year, thus ensuring quality raw materials in increasing amounts.
- The consumers are a factor that increases the competitiveness of local organic products, but at the same time ensures and improves the consumers' health, protecting their body. However, by acknowledging the quality and value of organic products for their own health, the constant consumption of organic products ensures a sustainable development of the domestic economy and agriculture.
- Increasing the measures intended to stimulate, support and direct help measures for the local producers taken by the Romanian State revives organic farming in rural areas, being a solution to

revitalize the countryside fallen into disuse in the last decades of the twentieth century.

Given the competitiveness of organic products in recent years, the potential proven in the last years of growth of the organically cultivated areas and the increasing of the demand for organic products on the Romanian market, the local organic production should be encouraged, stimulated and supported by the State, through new, distinct measures, focusing on increasing the visibility and quality of products, including by the qualitative protection recognized at European level through the system of protected quality of agri-food products.

Among the needs identified in this context regarding the organic production and the domestic food industry, related to the legal procedures of labeling, packaging and promotion of agri-food products, we mention the need to increase consumer confidence in the certified Romanian food products, increasing their share in the annual consumption (quantity and value), creating a strong/acknowledged national food brand through organic products protected at European level, but also the need to introduce specific agrifood business marketing methods such as market research, modern marketing and promotion techniques of Romanian quality products, direct sale etc.

However, the first indications regarding the organic quality and product protection are offered by the label of the organic product, the label being the bond between the product and the consumer. The label may determine the consumer's behaviour towards the purchase of a product, by the information provided managing to convince the average consumer, because in case of the consumers loyal to a product, the label represents only the localization and identification elements for the familiar product.

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ROMANIAN CONSUMERS BEHAVIOR REGARDING FOOD LABELING - SHORT ANALYSE IN THE FRAME OF IRSES 318946 PROJECT

O.B. OPREA¹, O. TIȚA², C. GEORGESCU³

Abstract: *The paper presents the methodology and the survey results accomplished in the frame of Irses 318946 PROJECT. The respondents answered to a certain number of questions, like "What influences more your decision to purchase a food product?", "To what extent do you think the food labels you eat provide accurate and complete information's?" and "On what grounds you do not always read the information on labels". To assess this issue, consumers need to complete the questionnaire with general information on gender, age, level of education, residence, monthly income, number of dependent children, job and marital status.*

Keywords: *labeling, brand, energy value, European Regulations, consumer behavior;*

1. Introduction

Knowledge and understanding of consumers behavior is of vital importance for policy makers in setting food policies, the relevant legislation and directions of development and research in society [1], [3], [15].

The study about the way how people think about food and its production, how they purchases or obtain their necessary food products, their own attitude towards health is entirely part of a multidisciplinary research that intersects both the social sciences and the natural and represent synthetically the consumers science [2].

Labeling represents, according to art. No. 2, let. a, of G.D. No.106/2002, any written material, printed, lithographed, engraved or illustrated, containing elements of product identification and which accompanies the product or is adherent to the package. The purpose of labeling is to give consumers necessary and sufficient information, verifiable and easily comparable, to allow them to choose a product which meets their requirements in terms of their financial needs and opportunities, and to know the possible risks to which they may be subject [4], [5].

The labeling may greatly change how a consumer perceives a product. By providing

information to consumers, nutrition labels have the potential to help achieve public health objectives. Information on labels is important for consumers when it comes to the purchasing process [6].

Packaging plays an important informational role, containing details such as list of ingredients, instructions for use, storage, nutrient intakes.

The energy value problem of the food arises in a different way from the past generations. Our food habits can help or worsen our health and well-being.

To acquire a food habit, the consumer must buy smart, he needs to read the labels on the food products he wishes to purchase and consume [12].

The main objective of the questionnaire is to evaluate awareness and decision in purchasing a food product by consumers in Romania.

To achieve this goal there have been set a number of other secondary objectives:

1. Establishing the most important element in the decision to purchase a food product;
2. Estimating consumer perceptions about its awareness after reading the food labels;
3. Estimating consumer perception relative to the most important components of food labeling;
4. Assessment of reasons for which consumers do not always read the information on food labels.

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To achieve these objectives there were realized a number of activities such as drawing up a questionnaire with 7 questions, to be completed by a representative sample of consumers in Brasov County [7].

2. Materials and methods

The issue of research underpinning this market survey is to collect information about nutrition labels and consumer perception about their attitude to the information specified on them. It was used a quantitative study through face to face questionnaire applied by the interviewer but also through online survey.

The questionnaire is a formalized set of questions designed to generate the necessary data for the implementation of the objectives of marketing research: formulation of questions ere made in order to meet the purpose and objectives of research, and to verify hypotheses.

For the no. 1 objective, namely to establish the most important element of a food purchase decision, consumers will respond to the question

"What influences more your decision to purchase a food product?" with the possible options: packaging design, price, brand, nutritional value. It is allowed to select a single choice. For clear results it is necessary that the sample of consumers interviewed to be representative for the county of Brasov.

For objective no. 2, estimating consumer perceptions about its awareness after reading food labels, consumers will respond to the question *"To what extent do you think the food labels you eat provide accurate and complete information's?"* giving grades from 1 to 10, 1 representing exclusive negative feedback.

For the 3rd objective, estimating consumer perception relative to the most important elements on food labels, consumer's responses will be given by checking the corresponding items in Table 1.

Table 1. *The extent of the food label*

<i>Elements of the food label</i>	<i>Very important</i>	<i>Important</i>	<i>Less important</i>	<i>Not important</i>
Country of origin manufacturer				
Net quantity				
Expiry date				
Name and adress manufacturer				
Health recomandations				
List of ingredients				
Substances or products that can cause allergies or intolerances				
Language, font size and colour				
Special storage conditions				
Energy value, kkal and kJ				
Quantity of certain ingredients				
Content of: lipids, carbohydrates, starch, sugar, salt, mineral substances, proteins, vitamins, etc.				

For the 4th objective, the reasons for which consumers do not always read the information on food labels, consumers will respond to the question *"On what grounds*

you do not always read the information on labels", their answer is given by selecting a single variant from Table 2.

Table 2. *Reasons why consumers do not read food labels*

<i>Reasons</i>	<i>Check with X</i>
Always buy products from the same brand based on previous positive experiences and habits; I see no need to read the label claims	
I believe that my choices are healthy	
I am too busy to read all the information	
I have no health problems	

There is too much information on labels, it's hard to understand	
I'm not worried and I'm not interested	
The decision to purchase is determined only by the products price	
I know that the product I buy is not healthy, but I buy it because I like it	
I believe that the label information's are not useful	

For clear results it is necessary that the sample of consumers interviewed to be representative for the county of Brasov.

To assess this issue, consumers need to complete the questionnaire with general information on gender, age, level of education, residence, monthly income, number of dependent children, job and marital status.

3. Results and discussions

Following processing and interpretation of data derived from the questionnaire there can be mentioned some relevant aspects:

For question no. 1 namely: „*What influences more your decision to purchase a food product*”, chart is as follows:

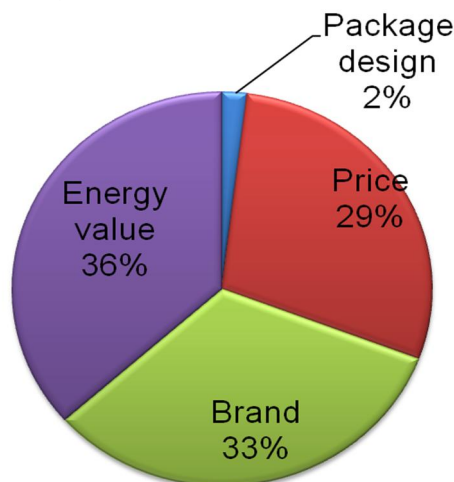


Fig.1. *Question no. 1 from questionnaire*

Of the 200 respondents from Brasov County who answered to the questionnaire, for question no.1, 36% felt that the energy value is very important, 33% considered that the brand is very important, 29% answered by choosing the price as very important and 2% felt that the package design is the most important.

After the energy value the brand is the most important, hence the fact that consumers are well informed when it comes to food products.

Package in case of food products, is a key component of the marketing mix. Packaging plays an important informational role containing details such as list of ingredients, instructions for use, storage, nutritional intake.

In Romania, consumers do not place great emphasis on the packaging.

While it is important that the package to reflect the values and brand positioning, the role of packaging is to support communicate thread mark - all pairings built by the consumer regarding the brand and formed before entering the store.

We are in a time when buyers are becoming more aware of the choices they make [8], [9], [11].

Being a promise of quality, consumers trust food manufacturers that stand behind the brand. When buying a product, there arise a lot of fears:

Is this product what I want?

Is it not dangerous to my health?

Does it worth the money?

Do I have to lose time purchasing another product if this one is no good?

Brands reduce a lot of these risks. The brand will always guarantee the products quality, and will confirm the confidence shown by buyers in the quality characteristics of the purchased product [13].

Nutritional value holds the largest share rankings (36%).

For modern man, the energy value problem of food products arises differently from that of past generations. It was found that physical exercises decreased in the last hundred years, which means that the energy needs of man decreased sharply to.

However, as a paradox of modern society, food has become richer in calories than in the past, so obesity and various diseases have increased dramatically [16].

Thereby food is not just food but an entire ensemble, which includes psychological traits, biological of person as an individual and as part of his environment - family, society, work, with

all that entails: cultural habits, religious, financial constraints and of time.

Nowadays, nutrition involves first choice: food choice, timing, amount, and these elections are held permanently in the feeding behavior: we can choose what to buy, what and how to eat, when to stop.

These elections have become extremely difficult in modern times, the food is everywhere, the quality is very variable, time is precious, financial constraints are high, and furthermore,

the food industry, media-media and commerce in general are extremely powerful [10], [17].

In the absence of appropriate choices, cheap food is consumed, with poor nutritional quality, and, most often, obesity and unbalanced metabolisms appears.

For question no. 2: "To what extent do you think the food labels you eat provide accurate and complete information's?" diagrama este următoarea:

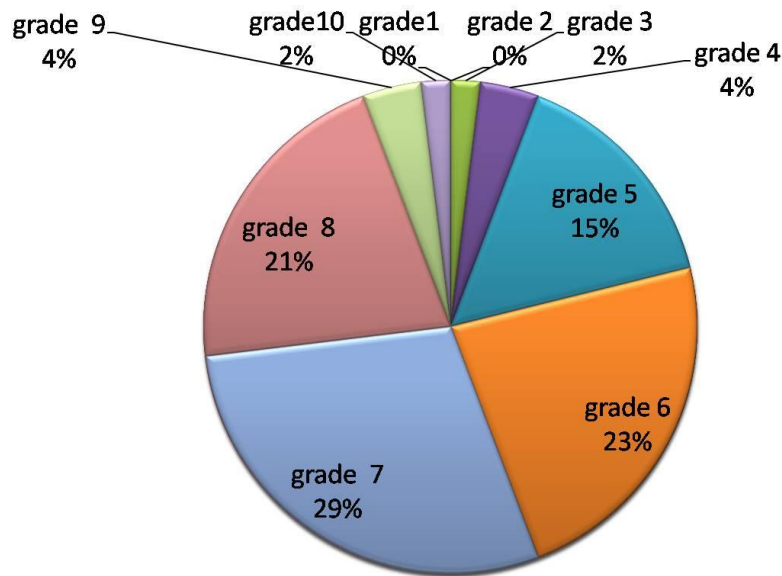


Fig. 2. Question no 2. from questionnaire

Only 2% of respondents believe that labels provide accurate and complete informations.

44% of consumers think that the presented information's on food labels are incomplete and incorrect.

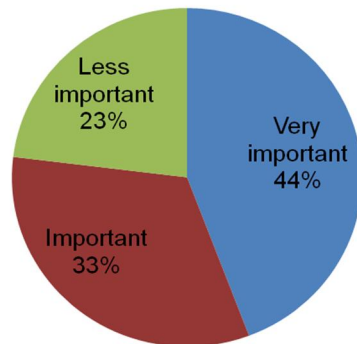
The consumer has become prudent and unforgiving, due to his limited available resources. In this context, the information has to reduce the uncertainty and to win the consumers confidence. Accurate and complete information is the most effective way to protect consumers against abusive practices.

The European Commission had to take certain decisions (specifying the permissible daily dose, country of origin, list of allergens) because with passing time, the technology evolved and as well

the ways to purchase products, and consumer requirements. Increasingly more consumers are complaining that they are not sufficiently informed and that laws differ greatly from one Member State of the European Union (EU) to the other, and thus the population of a given country is more misinformed than another.

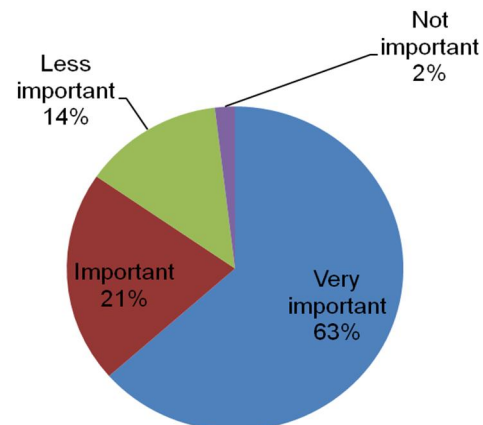
Regarding the 3rd question: "What is the importance that you give items on food labels", the results are shown in the following diagrams a-l:

Country of origin



a.

Net quantity



b.

Fig. 3. Question no 3. from questionnaire

a. – Importance of Country of origin of the product

b. – Importance of the net quantity on the label

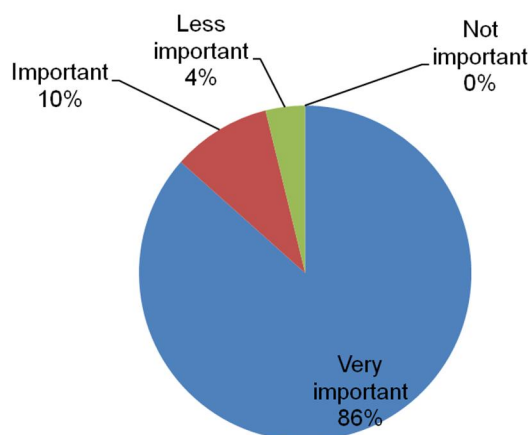
Country of origin of the manufacturer is important because it ensures that the entire product is traditionally manufactured entirely (prepared, processed and produced) in that area and so acquires unique properties.

It was imposed this measure to add the country of the manufacturer as the raw material may come from another geographical area (or country) because the unique quality and taste of

the product is not related to the origin of the raw material itself, but rather on its geographical area where processing occurs.

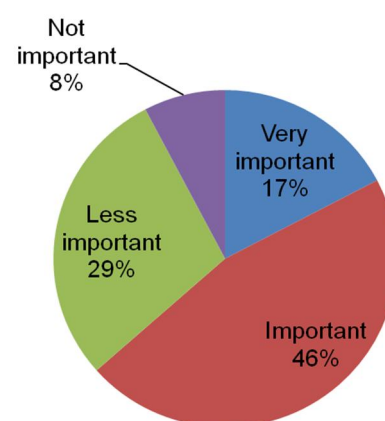
The finding indicates that the respondents consider in a proportion of 77% important and very important the producer country of origin, while 23% considered less important this issue. 84% of consumers think the net quantity as important and very important.

Date of minimum vallability



c.

Name and address of the producer



d.

Fig. 4. Question no 3. from questionnaire

c. – Importance of the date of minimum durability on the label

d. – Importance of the Name and address of the producer

86% of consumers think that it is very important to know the date of minimum durability, 10% consider it important, while 4% consider it less important.

The physical life of a food product is limited in time, even if, the degradation can be slowed because their stability is determined by substances that come into contact with other component substances and the scope of environmental factors.

The consumption deadline needs to be determined in order to limit the risks of consumers

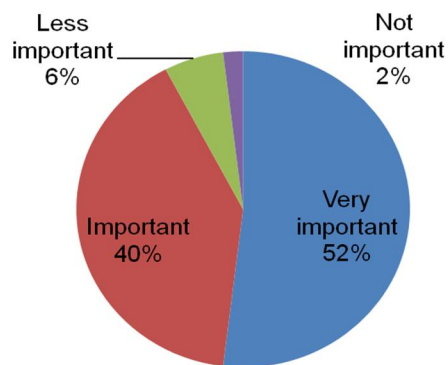
46% of consumers felt that it is important to know the name and address of producer, 29%

that is less important, 17% chose that it is very important and 8 % consider that this aspect is not important at all.

Knowing the name and address of the manufacturer gives extra confidence to consumers regarding food quality, and in this way they can form an opinion about the product in general.

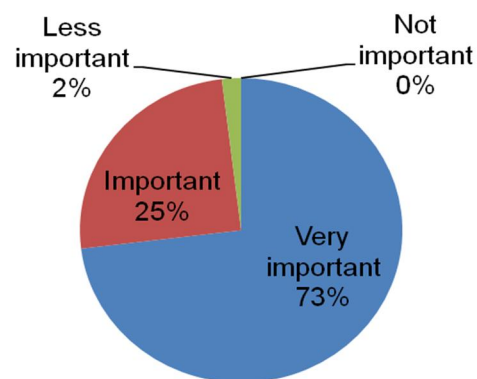
Transparency and communication with the consumer is addressed through the addition on the label of this correct information in order to help them make a decision on an informed basis.

Health recommendations



e.

List of ingredients



f.

Fig. 5. Question no 3. from questionnaire

e. – Importance of the health recommendations on the label

f. –The list of ingredients

Health recommendations are very important (52%) because the labels may contain health and nutrition claims only if they do not mislead. According to statistics, 10-15% of the general population suffers from allergies, with increasing tendency.

In this context, the EU imposed rules on labeling is welcome because people are not at risk of consuming products containing ingredients to which they are allergic.

There are patients that, for example, are allergic to peanuts.

There is a risk that the very small amounts or traces of these products may cause anaphylactic shock that can lead even to death.

Many of the food products we consume frequently have a high risk of allergies, like:

- Fish, seafood;
- Nuts, peanuts;
- Milk, eggs, mustard;
- Strawberries;
- Gluten;
- Sesame seeds, celery. etc

It is important to say what's in it, even if there are very small quantities.

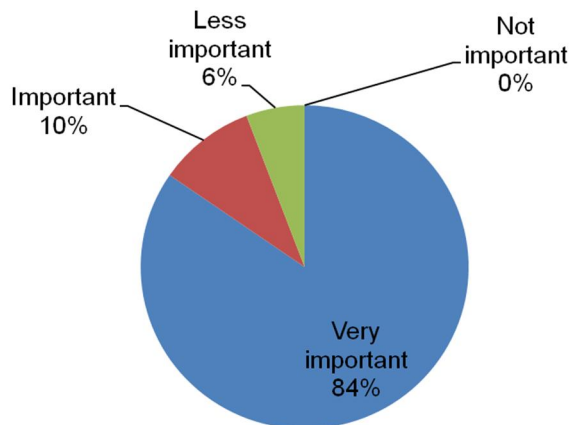
For consumers who answered our questionnaire it is very important the list of ingredients in 73%, 25% think it is important and 2% say it is less important.

All ingredients must be listed on the label in descending order of their amount.

Food additives, added vitamins and minerals must also be included in the list of ingredients. Food additives are entered in the list of

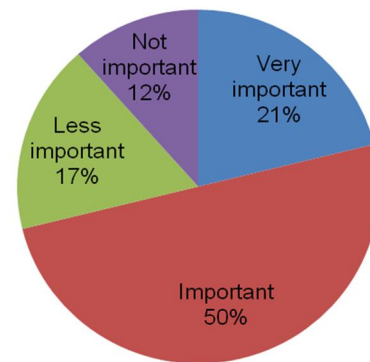
ingredients category they belong to (dyes, preservatives, stabilizers, sweeteners etc.) followed by the chemical name or numeric code.

Substances that cause allergy



g.

Language, size and text color



h.

Fig. 6. Question no 3. from questionnaire

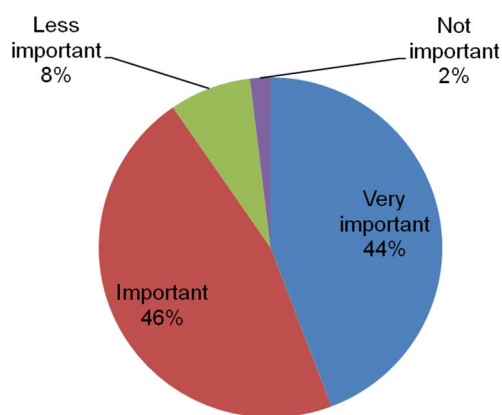
g. – The importance of the mention “Substances that cause allergies or intolerances” on the label

h. – The language and the font size of the information

84% of consumers think that the list of substances causing allergies is very important, 10% say it is important and 6% consider less important this issue. In December 13, 2014 came into force the law issued by the European Union

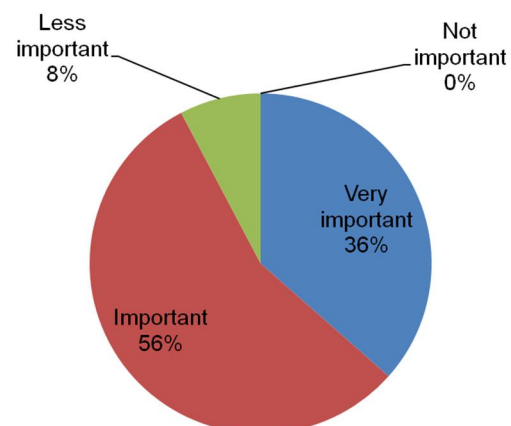
in relation to food allergens, and thereby enhances the existing general labeling and nutrition in a single regulation to simplify and consolidate the existing labeling legislation.

Storage conditions



i.

Energy value



j.

Fig.7. Question no 3. from questionnaire

i.- Mentions on labels of any special conditions for storage

j. – Importance of energy value on the labels

71% of consumers think that is very important and important that the information on labels to be written in Romanian, regardless of the country of production, without excluding the presentation also in other languages.

Labels must be visible, legible and printed in a way that does not allow deletion.

44% of respondents believe the informations regarding food storage conditions are important, 46% consider it important, 8% say that are less

important, while 2% of consumers have no interest in this.

Storage of food products should be made in a way to prevent alteration, degradation, chemical and biological contamination, contamination by dust or odors foreign to the nature of the product. 92% of consumers think that the energy value is very important and important while 8% think it is less important.

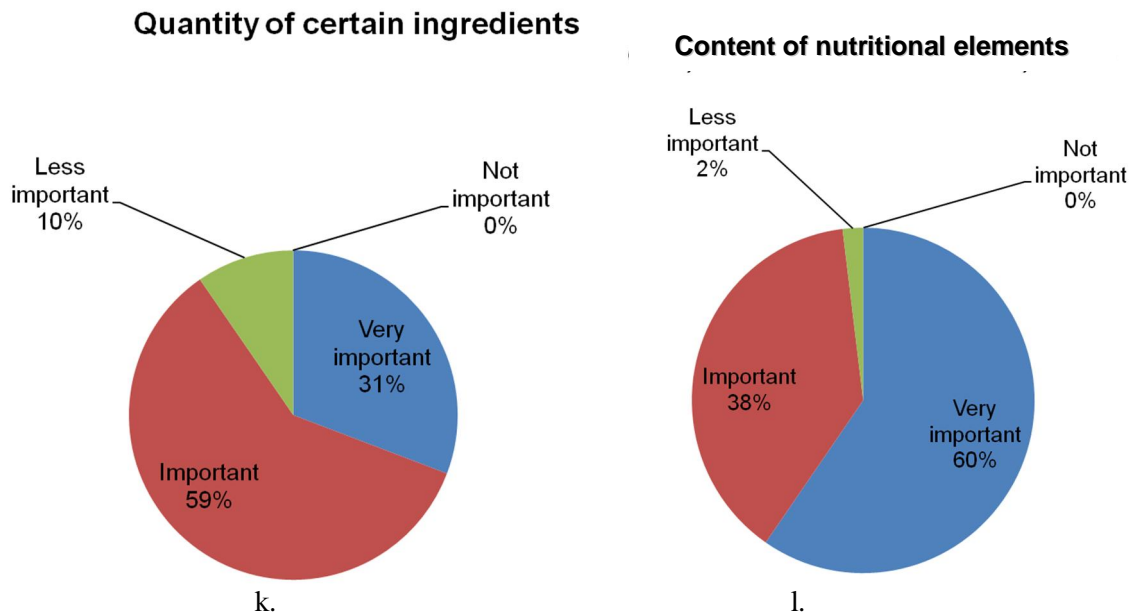


Fig.8. Question no. 3 from questionnaire

k. – Quantity of certain ingredients on labels

l. – The need of mention on labels of any kind of nutritional elements content

31% of consumers think that the quantity of certain ingredients is very important, 59% consider it important and 10% consider it less important. 60% consider the nutritional elements content very important, 38% that it is important, and 2% consider it less important.

For question no. 6 "On what grounds you do not always read the information on labels", the results are presented in figure 9.

Educating the client is very important. The running advertising campaigns in the media have an important role which should be "moral". With a single word it can create false expectations for the customer.

After interpreting the results of the questionnaire, it indicates that 41% consumers choose products based on previous positive experiences.

Once they have acquired confidence in a product and are happy with it, they do not hesitate to buy it a second time.

Also they no longer consider it necessary to read the label, assuming that they know the information on it.

13% of consumers do not consider necessary to read the label claims, relying solely on the fact that their choice is the best.

5% of consumers have stated that they are too busy to read the labels and 8% of those who answered the questionnaires said that they have no health issues.

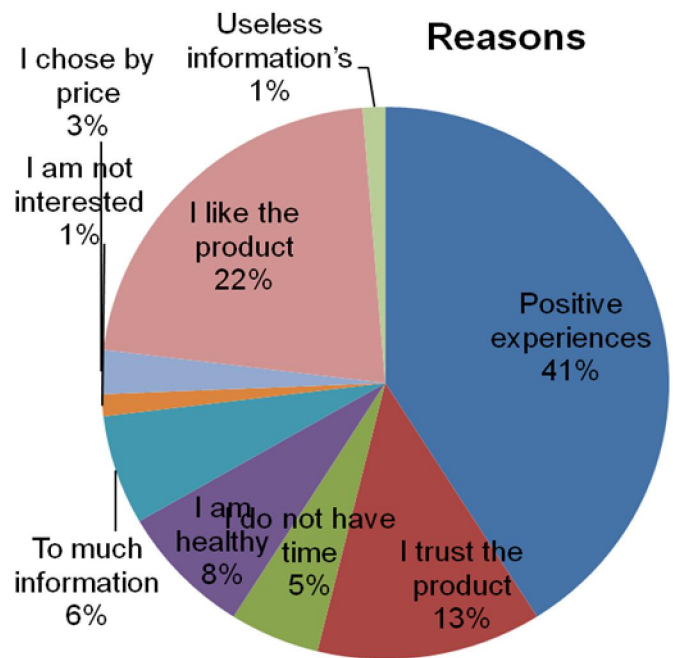


Fig.9. Question no.6 from questionnaire

For 6% of consumer the information on food labels are complex and difficult to understand.

1% of consumers are not worried and are not interested. The proportion of 3%, the buying decision is dictated by the product price. 22% of consumers buy products they like, despite the fact that they are unhealthy.

Unhealthy foods are extremely affordable, convenient, are designed so as to be palatable, they are heavily promoted and are cheap.

The desire and the inability to resist temptation arise not only in food addicts.

Consumers have recognized that are attracted in a large extent by the presentation of the product, beautifully and colorful package.

1% of consumers think that the information on the label is useless.

Conclusions

Of the 200 respondents who answered the questionnaires in Brasov, **36%** felt that the **energy value** is very important, **33%** thought that the **brand** is important, **29%** choose the **price** is less important and **2%** considered that the **package design** is not important at all.

As a conclusion, it is worrying that 64% of respondents do not realize the importance of nutrition value, by choosing products either by lowest price or by brand.

Only 2% of respondents believe that the label provides accurate and complete information's.

44% of consumers think that the information given on food labels is presented incorrect and incomplete.

For consumers who answered this questionnaire the list of ingredients is very important in a proportion of 73%, considering also that the health recommendations are very important 52%.

As a general conclusion, it is necessary to educate and inform the consumers in the field of nutritional labeling, increasing its chances to benefit from a healthy diet.

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DETERMINATION OF THE OPENING FORCE OF CARDBOARD BOXES BY SPECIALLY DESIGNED EXPERIMENTAL DEVICE

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Abstract: Determination of the opening force of cardboard boxes by using specially created device is presented. Check for the correspondence between the actual opening force and the measured by the experimental device is done. Regression dependency is written between the experimental results and examined adequacy of the model.

Keywords: force of opening, folding boxes, paperboard, experiment, stiffness, packaging automation

1. Introduction

Different types of paper and cardboard are used for manufacture of packages. There are over 600 existing types which differ mainly by functional properties, fiber content, the type of the processing method and the additional ingredients used for the preparation of the raw craft mixture.

The folding cardboard packages are manufactured in specialized factories as the packaging in them is widely used solution for packing of vast variety of products.

Cardboard packages are designed in a way which guarantees fairly good protection of the content stored in them. Many operations are executed to produce packages of paperboard such as creasing, cutting, printing, coating and sticking beforehand. The manufactured boxes are stored in folded state and corrugated paperboard packages are most frequently used for their (transportation) boxes. In this state the manufactured boxes take small space when stored and are easily transported. For the producers that pack their products in a folding cardboard packages, they serve as secondary package for the products (fig. 1).

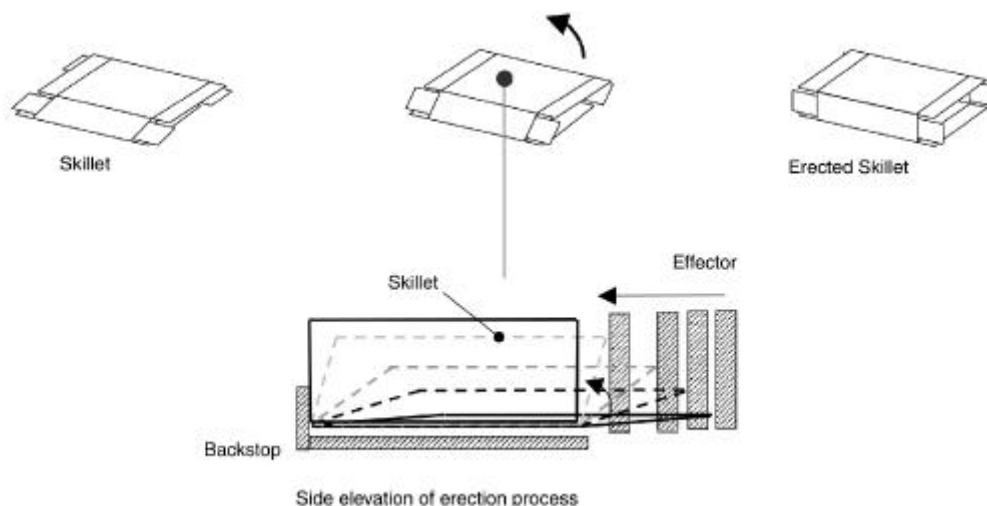


Fig.1. Process of unfolding of cardboard box

The finished packages are placed in oriented state in the feeding devices of the packaging machines. They have system which constantly pushed the boxes in a way so the first one is

always in a same position. Using vacuum catchers, the feeding devices pulls them and they open from folded state to form a sleeve (fig. 1). Depending of the package and the feeding device

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the boxes are furtherly formed, filled with the product in question and are sealed.

One of the most critical points in the manufacture of the cardboard packages is the transition from folded to open state of the cardboard package [3, 4, 6, 7, 10, 13, 14]. In the idealistic case it opens as a parallelogram-shaped mechanism, to form rectangular-shaped sectioned sleeve in which the product is inserted. The process is made automatic by using specialized technical equipment. In certain conditions the process of unfolding may fail and the walls of the package may bend inward or become deformed blocking the insertion of the products which results in significant delays of the process of manufacture.

The reason for the lack of ability to open the folding cardboard boxes may be related to the incorrect choice of the vacuum catchers, their number, their position, vacuum level, geometric settings of the feeding device, the box pushing (moving) force. Because of the existing interest in “innovative” design of the cardboard boxes [6, 11, 12, 13, 15] in order to represent the product in more attractive way, it is necessary to design a

new specialized packaging machines, as some scientists propose the application of additional modules for transformation of the processes [1, 2, 3, 5, 8, 9, 15].

The aim of the current work is to determine the dependency between the actual opening force of the cardboard box and the measured using specially designed experimental device.

2. Materials and methods

To determine the force necessary to open cardboard boxes, the experimental device on fig. 2 is used. The labels on the scheme are as follows: 1 – heels allowing the lining; 2 – metal skeleton of the experimental device; 3 – electrical engine; 4 – system for transformation of the rotary motion into translation – actuator; 5 – weight sensor; 6 – flexible element, connecting the cardboard box with the weight sensor 5; 7 – optical sensor, measuring the angle of opening of the box; 8 – cardboard box; 9 – base for fixing of the box; 10 – system allowing to change the degree of initial deformation of cardboard box.

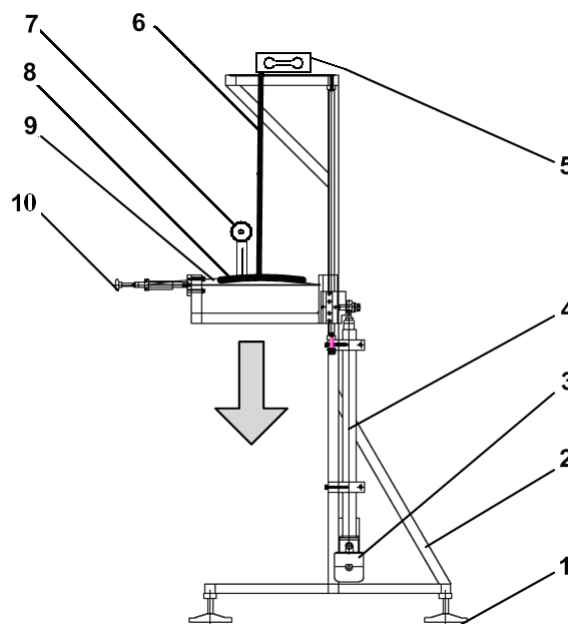


Fig.2. Experimental device for determination of the opening force of cardboard boxes

The experimental device is shown on fig. 2, while the working procedure is the following:

1. The tested box (fig. 2) is placed upon the surface of the basis 9 by using double-sided tape. Depending on the necessary testing, it is possible to set initial curvature on the folded box – inward or outward.

2. Setting of the curvature is done by using the system 10 in which basis a screw mechanism is installed.

3. By using the flexible element 6 the box is connected to the hook to determine the force necessary for unfolding of the cardboard box by using the weight sensor 5. The optical sensor registers the length of the displacement which is

function of the angle of opening of the specimen. To check the angle of opening of the samples, a measuring device Mitutoyo with measuring range of 10 mm. and 0,01 mm accuracy is used. It is attached to the testing device through additional prismatic base. The base 9 is fixed on the skeleton 2 using linear-translation module. This enables the base 9, along with the system 10 and the tested box 8 to move up and down following specific trajectory. The movement is created by engine along with screw mechanism 4. At rotary motion of the engine, the linear module does linear translation. The range of the linear module is defined by the geometric parameters of the box.

4. The active movement of the base is downwards i.e. the box opens as the base 9 moves down and the opening itself is due to the immovability of the upper side of the box, provided by the flexible connection in vertical state. The upper, attached to the flexible connection, side of the box is displaced

translational in horizontal and vertical state. Due to the tensile stress in the flexible element, the force is transferred to the weight sensor 5.

There is a system to register the force occurring at any given moment depending on the displacement a chart is drawn.

5. Using standard of weights, the opening force of the cardboard box is measured at preliminary setting of the range of movement of the wall of the box (corresponding to the range of the measurement with the experimental device).

6. Calculation of the regression dependency between the standard weights measurements and those registered by the experimental device.

3. Results

In table 1 the data on the measured eighteen values (N=18) at conducted five (k=5) repeats are presented. The obtained numerical values are presented in table 3.

Table 1. Measured values during the calibration of the tensometric sensor.

№	Standard weights measured x_n	y – results from the measurement with the experimental device				
		y_{n1}	y_{n2}	y_{n3}	y_{n4}	y_{n5}
		1 rep.	2 rep.	3 rep.	4 rep.	5 rep.
1	50,049	50	50,1	49,9	49,9	49,9
2	100,042	99,9	100	99,9	99,8	99,8
3	200,006	199,7	199,8	199,7	199,6	199,5
4	250,055	249,8	249,7	249,6	249,5	249,5
5	500,008	499,1	499,2	499	499	499
6	600,05	599	599,1	598,9	598,9	598,8
7	700,014	698,8	699	698,7	698,6	698,6
8	750,063	748,7	748,8	748,6	748,5	748,6
9	842,552	840,9	841,1	840,9	840,8	840,8
10	892,601	890,9	891,1	890,7	890,8	890,7
11	942,594	940,8	940,9	940,6	940,6	940,8
12	1042,558	1040,6	1040,5	1040,5	1040,3	1040,4
13	1092,607	1090,6	1090,6	1090,4	1090,2	1090,5
14	1142,6	1140,4	1140,4	1140,2	1140,2	1140,2
15	1011,164	1009,2	1009,3	1009,1	1009,1	1009,1
16	342,544	341,9	342	341,9	341,8	341
17	392,593	391,9	392	391,9	391,8	391,9
18	442,586	441,8	441,9	441,8	441,6	441,8

The measured data are shown on figure 3, as no significant deviations of the obtained values are not detected which corresponds to the propose for linearity of the function of the

dependency between the actual force and the one measure with the experimental device. An assessment is done of the linear function for number of measurements (N=18) and repeats

(k=4) as the following parameters are determined.

$x_{av} = 627, 482$ – average value of measurements with standard weights [g];

β_0 – crossing point of the function and the Y axis.

$y_{av} = 626, 263$ – average value of the measured magnitudes of the opening force [g];

β_1 – angular coefficient of the functional dependency;

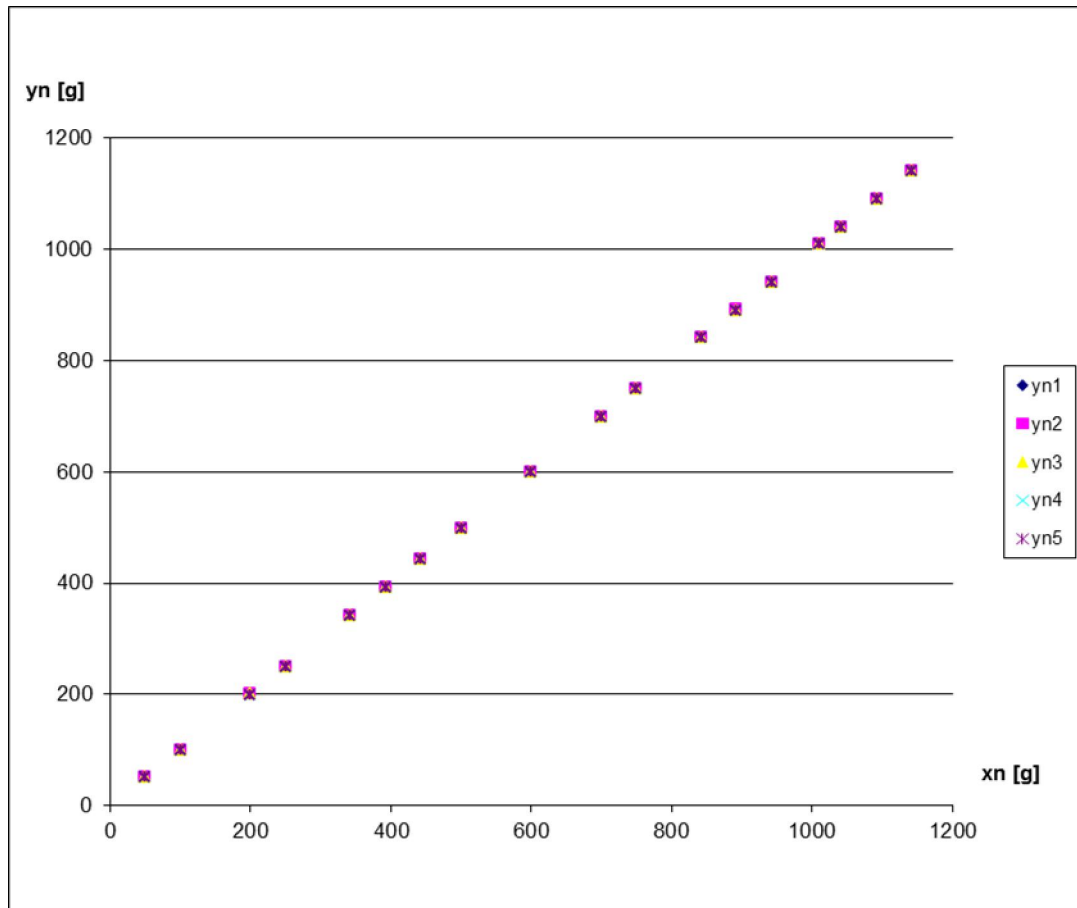


Fig.3. Measured values of the opening force

In table 2 are presented the average values \bar{y} for the results of the measurement:

Table 2. Average values for \bar{y}

N ₀	1	2	3	4	5	6	7	8	9
\bar{y} , [g]	49,96	99,88	199,66	249,62	499,06	598,94	698,74	748,64	840,9
N ₀	10	11	12	13	14	15	16	17	18
\bar{y} , [g]	890,84	940,74	1040,46	1090,46	1140,28	1009,16	341,72	391,9	441,78

Table 3. Obtainer results from the measurements and calculate values

Exper.	Range	Standard weights	y [g] – results from measurement					y [g] - calculated
			y _{n1}	y _{n2}	y _{n3}	y _{n4}	y _{n5}	
N ₀	s, mm	x _n [g]	1 rep.	2 rep.	3 rep.	4 rep.	5 rep.	
1	10	50,049	50	50,1	49,9	49,9	49,9	49,994
2	20	100,042	99,9	100	99,9	99,8	99,8	99,887
3	30	200,006	199,7	199,8	199,7	199,6	199,5	199,649
4	40	250,055	249,8	249,7	249,6	249,5	249,5	249,597

5	50	500,008	499,1	499,2	499	499	499	499,046
6	60	600,05	599	599,1	598,9	598,9	598,8	598,648
7	70	700,014	698,8	699	698,7	698,6	698,6	698,648
8	80	750,063	748,7	748,8	748,6	748,5	748,6	748,597
9	90	842,552	840,9	841,1	840,9	840,8	840,8	840,899
10	100	892,601	890,9	891,1	890,7	890,8	890,7	890,847
11	110	942,594	940,8	940,9	940,6	940,6	940,8	940,739
12	120	1042,558	1040,6	1040,5	1040,5	1040,3	1040,4	1040,502
13	130	1092,607	1090,6	1090,6	1090,4	1090,2	1090,5	1090,450
14	140	1142,6	1140,4	1140,4	1140,2	1140,2	1140,2	1140,342
15	150	1011,164	1009,2	1009,3	1009,1	1009,1	1009,1	1009,171
16	160	342,544	341,9	342	341,9	341,8	341	341,899
17	170	392,593	391,9	392	391,9	391,8	391,9	391,848
18	180	442,586	441,8	441,9	441,8	441,6	441,8	441,740

The Linear functional dependency is the following:

The chart of the linear functional dependency is shown on figure 4, according to the data given in table 3.

$$Y = 0,0463 + 0,998.x. \tag{1}$$

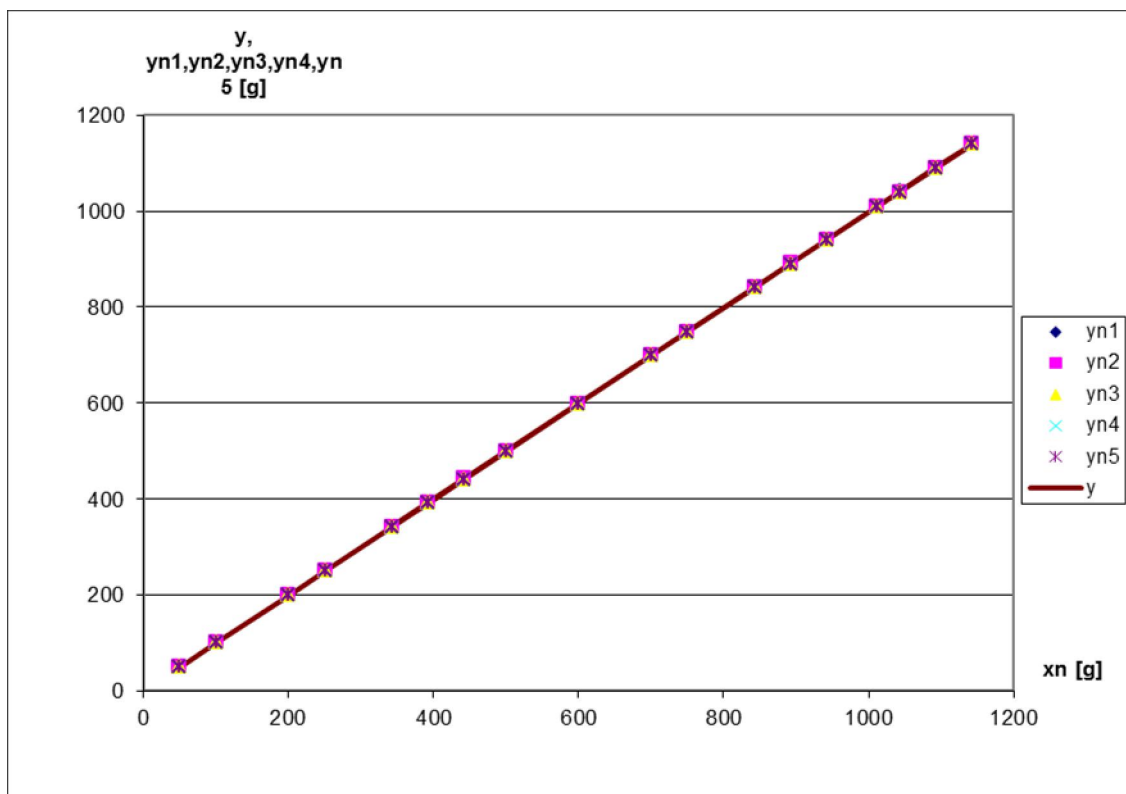


Fig. 4. Chart of the linear functional dependency

The distribution of the remains is presented in table 4. The transformation of the measured parameters while conducting next measurements is performed with the equation:

In table 4 and fig. 5 the remains from the calculated values based on the written linear functional dependency and the measured values with the specialized experimental device.

$$\chi_0 = \frac{(\bar{\gamma} + \beta_0)}{\beta_1}. \tag{2}$$

Table 4. Values of the remains

stroke	reference value	y[g] calculated value	Θ_{n1} 1 rep.	Θ_{n2} 2 rep.	Θ_{n3} 3 rep.	Θ_{n4} 4 rep.	Θ_{n5} 5 rep.
s [mm]	x_n [g]						
10	50,049	49,994	0,006	0,106	-0,094	-0,094	-0,094
20	100,042	99,887	0,013	0,113	0,013	-0,087	-0,087
30	200,006	199,649	0,051	0,151	0,051	-0,049	-0,149
40	250,055	249,597	0,203	0,103	0,003	-0,097	-0,097
50	500,008	499,046	0,054	0,154	-0,046	-0,046	-0,046
60	600,05	598,886	0,114	0,214	0,014	0,014	-0,086
70	700,014	698,648	0,152	0,352	0,052	-0,048	-0,048
80	750,063	748,597	0,103	0,203	0,003	-0,097	0,003
90	842,552	840,899	0,001	0,201	0,001	-0,099	-0,099
100	892,601	890,847	0,053	0,253	-0,147	-0,047	-0,147
110	942,594	940,739	0,061	0,161	-0,139	-0,139	0,061
120	1042,558	1040,502	0,098	-0,002	-0,002	-0,202	-0,102
130	1092,607	1090,450	0,150	0,150	-0,050	-0,250	0,050
140	1142,6	1140,342	0,058	0,058	-0,142	-0,142	-0,142
150	1011,164	1009,171	0,029	0,129	-0,071	-0,071	-0,071
160	342,544	341,899	0,001	0,101	0,001	-0,099	-0,899
170	392,593	391,848	0,052	0,152	0,052	-0,048	0,052
180	442,586	441,740	0,060	0,160	0,060	-0,140	0,060

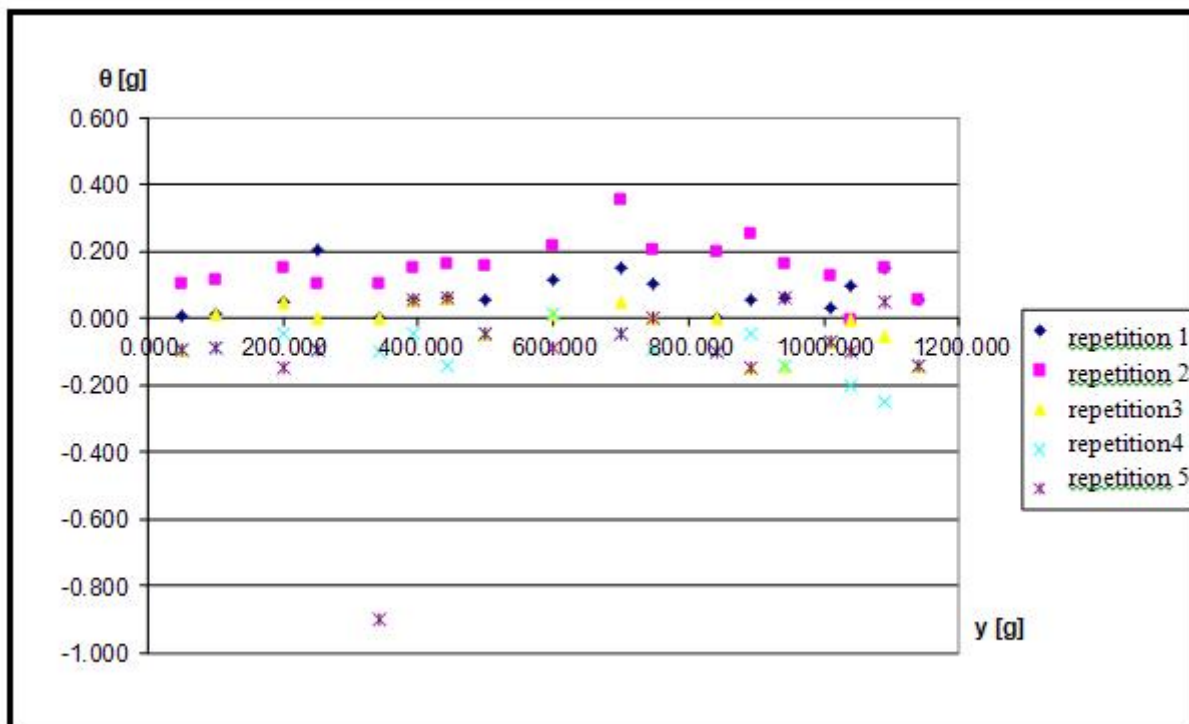


Fig. 5. Distribution of the remains.

The lack of grouping of the remains shows the correctness of the written regression dependency

between the movement of the active basis and the magnitude of the opening force.

On fig. 6 the dependency between the movement of the active basis and the angle of opening of the tested cardboard package is shown.

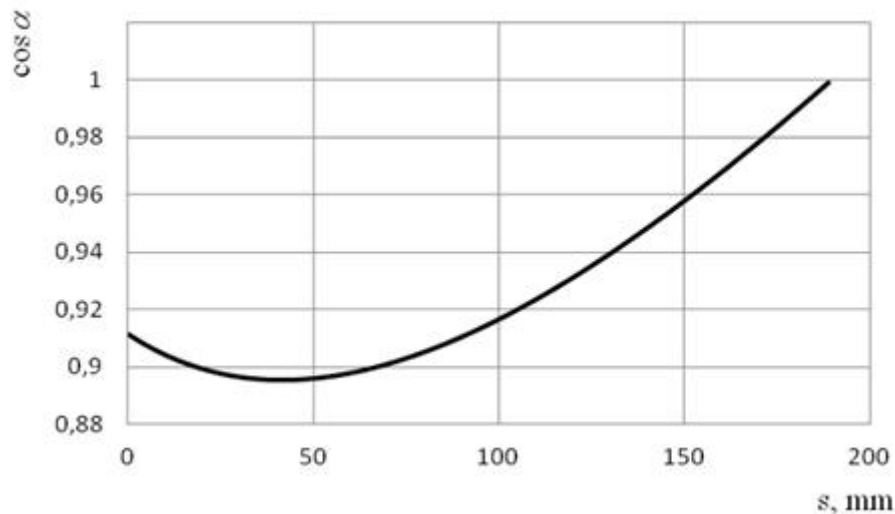


Fig. 6. Dependency of the movement of the basis on the correctional coefficient $\cos \alpha$

4. Conclusion

1. The opportunity for determination of the opening force for cardboard boxes by using specially designed experimental device is presented.

2. The dependency between the actual opening force of cardboard boxes and the measured with the experimental device is determined as the correspondence is observed with sufficient accuracy.

3. Regression dependency between the actual opening force of cardboard box and the registered with the experimental device is written.

4. Regression analysis of the written regression dependency is conducted (for adequacy, significance of the factors) on the proposed mathematical model on the dependency between the actual opening force and the measured by the experimental device.

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ECOLOGICAL SIGNIFICANCES IN THE DYNAMICS OF THE “BLUE ENERGY” CONCEPT FOR THE HOLISTIC RELATION MAN-NATURE

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Abstract: *The study sustains the idea that the energy of the living organisms, and mainly the energy of the human organism, constitutes a regenerable resource defines the blue energy, establishes its place, role, structure and dynamics between the other natural resources. The study researches are linked to the problem of energy on direction of Energy - Environment – Life, with an approach through the model of emergent integration in the Complex System Man-Environment. It is underlined the harmonizing manner of the energetic flows, of the chemical energy and of the implicit biogeochemical cycles, through the process of Ecoemergent Integronics. The process evaluation is based on the quantification characteristic to the eco-energetic systems and it may be approached the eMergetic analyses. It is put into evidence a form of change of an evolutionary and integrative type, having as a result the achievement of something totally new and with the apparition of new properties, of a superior order. It is thus analyzed the interaction which manifests itself through the dynamics of the vital energy implicit to the genetic patrimony, in relation with the environment, being structured the concept of vital eco-energetism at the organismic level integrated in the Man-Environment System, or the flow of “Blue Energy”*

Keywords: *blue energy, regenerable energy, eco-energetism, integronics, emergence.*

1. Introduction

The specialty literature is rich in studies, ideas and concept appeared during the time, referring to the vital energy of the organisms (especially of man), and the approach being extremely diverse. Without entering into details, we enumerate some aspects of this problem in order to underline its complexity, but also its shortages.

1.1. Classical direction of approach to human energy

Thus, a first point would be the history of the relation between the vitalism doctrine and science. Vitalism, defined by Merriam-Webster dictionary, is: a doctrine that sustains that the functions of a living organism are due to a distinct vital principle of biochemical reactions and, also, that it is a doctrine which sustains that life processes are not only explainable through the laws of physics and chemistry and that life is somehow self-determined. Therefore, whereas vitalism calls down a vital principle, that element is often called „vital sparkle”, "energy" or „vital flush”, and some people consider the „soul „as its

equivalent. On these directions Joseph C. Keating, Jr. (in *Biographical sketch*) discusses the past and present roles in chiropractic and calls vitalism "a form of bio-theology".

The inheritance of vitalism, instead of leading to a victory, leads rather to a number of new approaches of science, which include *holism*, *organicism* and *emergent evolution*. Thus, Jan Smuts, in his book *Holism and Evolution* (1926) had a holistic approach to science and offered a compromise between mechanicism and vitalism with this *theory of holism* (Peter J. Bowler, 2001). In 1981, the biochemist Rupert Sheldrake, in his book “A New Science of Life: The Hypothesis of Formative Causation” has developed the idea of the non-local and non-physical morphogenetic fields (Amit Goswami, 2008). On the other hand, Sheldrake has rejected both materialism and vitalism (though he admits having been influenced by vitalism) and pretends that his work fits *organicism* (Bertalanffy L., 1962, Sheldrake, R., 1981).

Emergentism manifested at the beginning of the 20th century, when Conwy Lloyd Morgan united both vitalism and mechanicism in his theory of emergent evolution, and, after Morgan,

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life emergence and mind emergence are both miracles and cannot be explained by physics or chemistry, or only through biological interpretation (Birch, Ch., Cobb, J.B., 1985).

Subsequently, it may be observed vitalism refinement which may be recognized in contemporary molecular histology, through affirmations linked to certain key organizations and characteristics of organism structures, perhaps even life itself, being examples of emergent processes.

The systems in which a large complexity appears, as the Man-Environment ones too, from process interaction (chemical, for example), which form cycles interconnected by feedback, cannot be completely described in terms of those processes, as the system, as a whole, has properties which lack to the reactions that constitute it (Schultz, SG., 1998; Gilbert, SF; Sarkar, S., 2000, Tuluca et al., 2007, 2011).

The emergent evolution has had an important route especially on direction of the development of psychology and neurology. Though Freud and Jung remain very influent, the *mainstream* psychology has made a determinant effort to give up what is mystic in these concepts, trying to appear closer to pure chemistry and physics sciences (Warren, HC., 1918).

More recently, the neuroscientist Roger Sperry, in his speech at the Nobel Prize award, in 1981, has described the modern science concepts of conscience nature and the relation with the properties of brain processing and emergence.

In recent periods, the human organism energy has been also linked to the term of "*bioenergetics*". It has a rather large semantics, covering both the explicable scientific dimension, and the inexplicable one (towards "paranormal"). It is applied, for example, in biochemistry to refer to certain exchanges of energy measurable inside the organisms, but also between organisms and environment, through physical and chemical normal processes.

It is also applied in situations that imagine bioenergetics field as a living holistic force, which goes beyond reductionist physics and chemistry (Stenger, V.J., 1999). Also on this direction, with some reserves of course, appear the step referring to biologic transmutation (Kervran, L., 1959), where energetic emissions are linked to molecular or atomic modifications of the type of reactions of nuclear fission that take place in a controlled manner (at proper will) (e-Bibl.:1).

1.2. A new direction

The human organism and the environment represent a complex system. The organism must therefore be regarded in a permanent interaction with the environment (air, water, soil, objects, living creatures etc.), the interaction which may be in sense of receiving energy from the environment, but also in sense of soliciting the organism and energy consumption through a number of environment factors (physical, chemical, biological, psycho-social). This *energetic dynamics* becomes emblematic for the **man-environment integrated system**, which underlines the idea that this dynamic will not be able to function if the **organism energy** would not continuously regenerate. Thus, living organisms energy becomes itself a natural resource, that we meet again at the level of complex and hyper complex systems (of the type Man-Environment, Ecosystem, Environment-Economy system etc.).

In function of the form of manifestation and the type of conversion applied, the energies identified up to now are those of permanent resources: the energy of solar radiation, water energy, wind energy, geothermic energy and biomass energy (Margarit, C., 2006). All these, because they have an ever-living character and do not produce significant environment impacts consequently to conversion, are generically called "*green energy*". On the other hand, at the level of whole observable Universe, where simulations concern gravitation and black matter, it is known the algorithm which also allows the inclusion of baryonic gases or of *black energy* described by Stefano-Corasantini / CNCS France (Gruia, R., 2011 b). We have mentioned all these because in the present paper we will define "*blue energy*" *sintagma*.

2. Work Method

The analyses of the human energy integrated in the Man-Environment complex system may be made by considering the integration dynamics as a methodology in itself, which becomes an application of the **Theory of Eco emergent Integronics** (Gruia, R., 2009). Thus, emergent integration (in expression of *integronic eMergy*), being in relation with Information (I) associated to Energy (E) is capable to induce complementary tridimensional processes in the systems: synchronic, syncretic and synergic (S³), having as a result the emergence (emS³) and, at

the systemic level, the eco-emergence (eco_{emS}^3). Therefore, the principle of *eco-emergent integronics* (eco_{emS}^3-I) may describe the system coexistence and the study of integration processes as a form of change of an evolutionary and integrative type, of the interrelations between living organisms and their living environment. There are put into evidence man's relations with its natural and social environment, having as a result the achievement of something totally new and with the apparition of new properties, of a superior order.

In the mentioned interrelations, the human organism energy integrated in the environment energy represents a basic element of the Complex System „Man-Environment” (cS_{M-E}), which represents in fact an Eco-Energetic System. This type of system may be methodologically approached by a unifying and integrator analyses, i.e. by the *eco-energetic* or *eMergetic analyses*, (Odum, H.T., 1983, Pillet, G., Odum, H.T., 1987).

3. Results and Discussions

In the world energy problem it is not explicitly discussed that *integrated human bioenergy* in cS_{M-E} is formed of energy, probably the most important on the Earth and the most fluctuant and sensitive to losses and degradations. If we imagine a global energetic chain, it is certain that human energy is its superior final.

The analyses of the most precious regenerable energy, i.e. human energy result of the Man-Environment integration, presuppose the existence of. First of all, the manifestation of this energy type is linked to the organism of every individual, respectively to what we call organism or being, i.e. living body, organized by metabolism and reproduction. We speak therefore about the *organism level*, characterized by system selforganisation, which has become possible as soon as it was observed that an open system entropy (as for example cS_{M-E}) depends both on the entropy produced in irreversible processes which take place inside, as well as on entropy variation due to exchanges with the environment.

3.1. Genotype – Environment energetic interactions

The „Man-Environment” Complex System is characterized by a permanent energetic regeneration of the organism, having as

complementary components in this energetic dynamics: incorporated external energy and intrinsic energy.

Incorporated external energy is based on the *concept of energetic externality*, which codisciplinarily combines the notion of externality through its ecologic and energetic dimension, with biologic sciences and those of the environment. The energetic externality represent the energy infusion, being practically part of the environment in material resources at disposal of the given system and not only the one to be found in a living organism or, if it is the case, in an economic product.

In case of eco-energetic analysis, it is practically analyzed the *eMergy* of two elements that are retained at the systemic level: energetic *flows* and energetic *stocks*. These elements may be grouped in three categories: external sources, environment sources and, respectively, what has leaked outside the system (Gruia, R., 1998). Otherwise said, all the components of a system integrated in the environment must find in the environment enough *food* and other necessary elements coming from the physical environment, in order to grow and maintain alive, components converted into energy. Similar to an ecosystem, in cS_{M-E} the beings absorb, transform and allow circulate energy and different materials, which they give then back to the environment.

These components must be scientifically studied from the point of view of the biophysical and biochemical stereostructure, which, by adequate utilization of sophisticated apparatus, allow the identification and individualization of the bioactive natural compounds from food directly implicated in the energetic dynamics.

Permanent interactions between structural elements of the same complex system represent in fact *the ways* by which energy and the respective elements are allocated.

In this context, *food* is of maximum relevance for human energy, i.e. the alimentary field with all its production components – primary aliments (agricultural), industrial aliments (or from food industry) and composite aliments (i.e. food result of culinary production specific to gastronomic engineering) - , are components of the alimentary act, sustaining energy generation for the organism (Gruia, R., 2011 a). The basic idea is to impress *energetic values* to these alimentary satisfiers.

The energy necessary to life maintenance is in direct relation to the apparition, constitution and organism development, i.e. with the energy

coming from the environment. Living organisms from cS_{M-E} , therefore human organism as well, interacts with the environment through three categories of exchanges (Barnea, M, Calciu, Al. Under redaction and col., 1979): material (substances with plastic role), energetic and informational (selfregulation). The energetic contribution comes from solar energy, directly or indirectly through intermediary sources, up to energetic foods, that organism transforms, by producing energy (including giving back to the environment).

What has been described represent the ideatic support of *emergent integration* of man in environment and of *permanent energetic regeneration* of his organism. Though the body composition is almost identical from a person to another or from a moment to another, consequently to the exchange of substances and energy with the environment, it is to be observed that it is all the time another one. The organism is always another one through generation, consumption and different regeneration of its energy at intraorganismic level, which appropriates the analysis of the resultant energy.

The intrinsic organismic energy is specific to the „mind/body system”, this system being *de facto* subscribed in the individual DNA. It is the energy linked to the organism genotype (G), which, as it has already been mentioned, is in direct relation to energetic externalities, i.e. to the regulator Environment. In genetics one therefore starts from two main factors, namely the *hereditary* inheritance and factors linked to environment conditions in which the organism develops itself (Gruia, R., 2000). From this perspective we conclude that the heredity essence is *self-reproduction of organism on behalf of the environment*. Thus, the body mass of an organism (i.e. adult animal) is 50 billion times larger than that one of the zygote from which it formed itself. The source of this impressive growth is the environment, especially by *food*, as main energy source.

The genetic inheritance of each individual induces a biologic individuality, therefore metabolic too, and the different levels of metabolism lead to different models of energy production (Chopra, D., 2005). The individual energy level is the result of a large number of variables (food and digestion quality, environment temperature. Thoughts, emotions etc.), and this primary level of vitality is determined by the quality of links established

with the energy unified field that surrounds the human organism.

Therefore, the energetic dynamics of the human organism is based on the organization of the parts as a whole and in the system, so that the physical and chemical elements get new superior characteristics. This means that vital energy overpasses by quality the simple physical and chemical processes. We get thus to observe that vital energy of the human organism (and not only) has as a processual support the *emergent integration* (Gruia, R., 2009). In other words, the anatomic and physiologic organization of the organism components, from cell to organs and devices and then to the organism as a unit, isn't made by a simple summing up, but by a continuous growth of the *energy quality* (implicitly both of the substance and of the information), in which the whole subordinates the parts, and the superior elements subordinate the composing ones.

In systemic vision and in a holistic evaluation of complex and hyper complex systems, as “Man-Environment” Complex System too (cS_{M-E}), or the ecosystems (Gruia, R, 1993), the elements the organisms take over from the environment are used in a certain situation, the interaction that manifests itself especially through the *dynamics of vital energy implicit to the genetic inheritance, in relation with the environment*. It is what in essence represents *vital eco-energetism of the integrated organism* or “*Blue Energy*”, process which in fact determines what *is* the individual at a given moment, or how he *will develop* in the future.

3.2. *Blue Energy, from sintagma to concept and paradigm*

The Blue Energy syntagma is presented in the specialty literature, as for example:

Blue Energy: electricity production from salinity gradients by reverse electro dialysis by Post J.W. (2009); ‘Blue energy’ from ion adsorption and electrode charging in sea and river water by Boon & Roij (2011); Near-infrared-to-blue energy upconversion in $LaF_3:Ho^{3+}$ de B. R. Reddy, S. Nash-Stevenson, and P. Venkateswarlu (1994); Blue organic electro phosphorescence using exothermic host-guest energy transfer by Forrest et al (2003); Confinement of triplet energy on phosphorescent molecules for highly-efficient organic blue-light-emitting devices by Jijima T et al (2003) s.a. The concept of Blue Energy has also been analyzed in an anterior

paper, which are the bases of the present demarche (Gruia, R., 2011 b).

On the other hand, we consider our anterior researches to be significant, which directly or indirectly led to the integrated energy concept linked to „*bios*” through aliment and biomass: Product and technology to obtain flavonocidal nutraceutic concentrate with revigorating and antiviral potential (Brevet A 01121), Functional aliment with bio protective antioxidant potential and complex physiological implications (Brevet A01119), Profitable opportunities to reduce external costs of the environment impacts, by performant processing with physical and biotechnical proceedings of bio wastes (Elisaveta Tuluca and col., 2004) etc.

The energy in relation to ecology and to complex systems of the Ecosystem, Man-Economy, Man-Environment, etc., type is the basis which structures the *idea of eco-energetism*. This one refers to generable energy principles and of energetic efficiency in relation to the integration in the environment, which

becomes also significant in the development and promotion of modern technologies, of innovations in the field of regenerable energy and of energetic efficiency. The generous mentioned idea may put into value the human energy, to which it may provide a new dimension too.

The energy of the organism integrated in the environment is *de facto* a summing up of the processes of cell, tissue, different organs energetism, at individual level an of the organism connexion (and of its energy) with energetic externality of its environment. All these thus constitute an *ecologic energetism of the integrated organism* (human first of all, but also animal, vegetal, respectively of the biocenoses and of the system in its whole) or, shortly said, we speak about the *concept of organismic eco-energetism*. This concept is practically linked to the efficient production, transmission, distribution and consumption of energy on the flow (stage of preliminary studies) precised in fig.1.

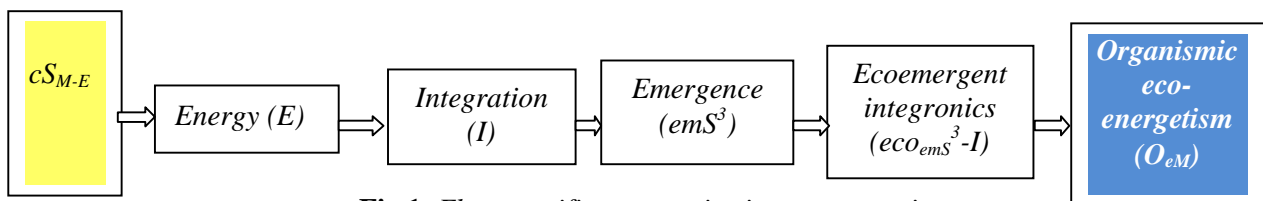


Fig.1. Flow specific to organismic eco-energetism

The final of this flow is integrated vital energy of the individual, which is specific especially to the *human organism*, but qualitatively simplified forms also characterize the energy of animal or vegetal organisms. The quantification may also be done at the population level by a certain summing up of the individual eco-energetism.

In order to facilitate the understanding of all the mentioned aspects, we consider it useful to use a simplified and relevant syntagma, so that when we refer to „*regenerable human energy necessary to life maintenance*”, respectively to the complexity of the „*concept of complementary organismic eco-energetism with the concept of integronics, related to the Man-Environment Complex System*”, to use the „*Blue Energy*” syntagma. Why „blue” energy? Generically said, the Blue Planet is the planet of the people with their specific organismic energy, a noble energy, where *blue* signifies the idea that life is an endless process, sensation of *perpetual integrated vital energy* and sustained by the sky and the ocean (symbolically blue). The blue energy includes the idea of *energeia*, of *vital élan*, of

vitalism, as well as the *Qi concept* (from the Chinese culture) signifying *life energy, life force, energy flow*. On this direction, „blue” represents the spiritual aspect of life. The blue makes sure our relation to the spiritual world. The nature of blue energy is to connect our being to the universe. The blue has the most healing power in the world. It is the color of purity and brings calm, peace, serenity and beauty (e-Bibl.:2).

As a basic characteristic, the Blue Energy is a *regenerable energy* because it has an ever-living and cyclic character, and a specific transformational dynamics. The ever-living character and the dynamics of the Blue Energy gives it the characteristics of the regenerable energies, because it refers to its manifestations which are governed by the principle of energy conservation, as well as through its cyclicity along life (energy transformation), respectively through the hereditary transmission of the energetic dynamics mechanisms of the organism in successive generations. Life is in fact a „continuous fire” „sustained by Blue Energy and its components (fig.2).

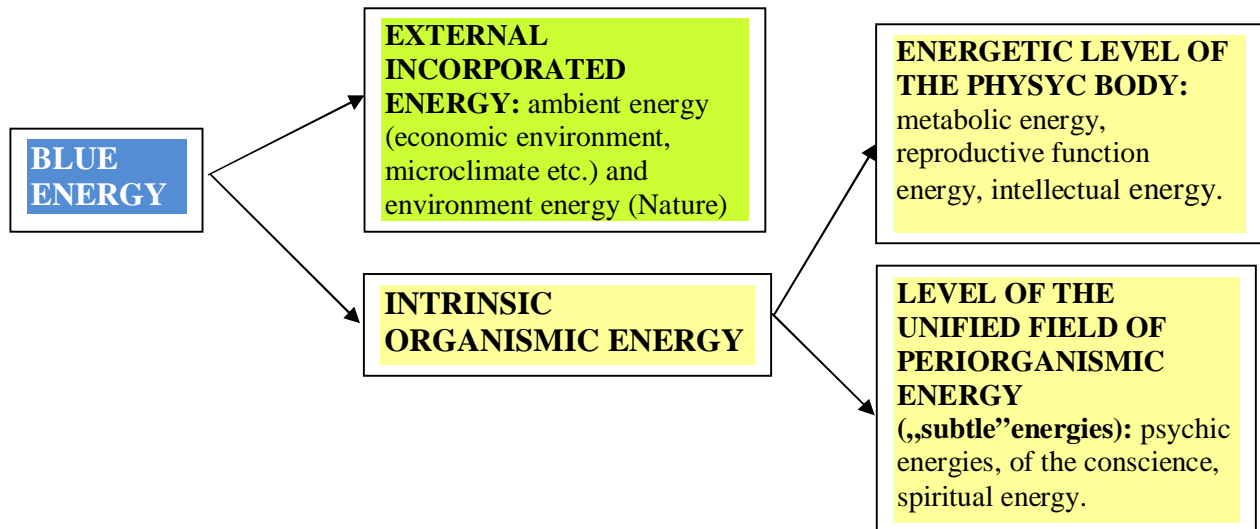


Fig.2. Component elements of the Blue Energy

The energetic flows allow vital energy the mental-spiritual energetic level, through the generation and regeneration of the organism, not process of emergent integronics (table 1). only at the level of the physical body, but also at

Table 1. Blue Energy - Existence and Manifestation

Nr. crt.	CATEGORY	ENERGETIC LEVEL	SPECIFIC ENERGETIC FLOWS
1	Oganismical energy	Energetic level of the physical body (intrinsic vital energy; concrete energy)	-Metabolic energy -Energy of the reproduction function -Intellectual energy
2	Subtle energies	Level of the unified field of periorganismical energy	- Energo-informational phenomena as latent bioenergetical resources, which contribute to harmonizing the body with the human soul – level which isn't dealt with in the present investigations; OBS: Even if without solid scientific demonstrations, it may be taken into consideration the hypothesis of their action at the level of the human body, especially in the context of defining and objectifying different types of subtle energies.
3	Energetic externalities	Energetic level as external energy from the environment, incorporated by the living organism (interface of integration in the environment)	-Energy extracted from food and water, water and solar light (energy), i.e. it is sustained by the natural environment (low energy). -Solar energy by the process of exergy [e-Bib.3] (technically sustained by the physical principles of the conversion of conventional or alternative energy) leads to getting food, implicitly to the energy offered by these. -Ambient environment energy is to be found in energy specific to existential microclimate of the organism and of the economic and social environment (example: high energy of the financial flow.
4	Complex system „Man-Environment” (cS _{M-E})	Integronic and regenerable energetic level	-Concrete energy, subtle energies and energetic externality, by complementarities and by the process of eco-emergent integronics (eco _{ems} ³ -I) induce organism integrated eco-energetism, expressed as organismic eMergy (O _{eM}), i.e. Blue energy.

Therefore, Blue Energy is fundamentally composed of the totality of the psychic and physical characteristics represented by quantic fluctuations of the field unified by energy at the

level of the living organism (human, but also animal or vegetal), or at the population level, integrated organisms in a well-defined system „Man – mind/body & Environment”.

Conclusions

The concept of Blue Energy represents in essence the energy of living organisms integrated in the environment, having in prime plan the regenerable human energy necessary to life maintenance and development, i.e. it represents the expression of the idea of complementary organismic eco-energetism with the concept of integronics, in relation to the „Man-Environment” Complex System.

The Blue Energy is composed by the totality of physic and psychic characteristics represented by quantic fluctuations of the unified field of energy at the level of the human organism, characteristics that lead towards a type of regenerable energy, different from other forms of energy of this type, being a type of integration of the cell, tissue, of different organ energetism processes at the level of the individual and of the connection of organism energy with energetic externality of its ambient (socio-economic and technical) and with the environment, based on the principle of emergent integronics characteristic to the system „Man – mind/body & Environment”;

The energy of the living organism integrated in the environment is *de facto* a resultant energetic flow (symbol of life) which passes through the complex systems (including of the Man-Environment type), flow which, consequently to successive integration leads to an emergent evolution represented by the Blue Energy necessary to the optimization of the energetic accomplishments and of the mechanisms of systemic „piloting”.

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CONSIDERATIONS FOR ECOLOGICAL CONSTRUCTION AND ORGANIZATION OF CONSTRUCTION

GH. C. SPIRCHEZ

Abstract: *This paper shows the importance of insulation materials for wood constructions. Natural insulating materials are characterized by a number of features which if used correctly can substantially improve the energy performance of a building. Insulation from sheep's wool is a unique material, its ability to breathe. Practically this means it has the ability to absorb and release moisture from the surrounding air. Wool insulation is used as heat and sound insulation. Wool is a hygroscopic material which means that is designed to absorb up to 30-40% of its own weight in moisture content. Thermal conductivity is between 0,0356 W/mK-0,040 w/mK. Sheep wool insulation is fire resistant. The paper has been taken to study three structures of insulation for passive energy house with software for Germany company were mapped graphics on temperature profiles coefficients from moisture and heat. Given that structure 1 heat transfer coefficient $U = 2,03 \text{ W/m}^2\text{K}$, structure 2 is the heat transfer coefficient $U = 0,330 \text{ W/m}^2\text{K}$, structure 3 is the heat transfer coefficient $U = 0,116 \text{ W/m}^2\text{K}$. A low U -value indicate a high level of insulation.*

Keywords: *insulation, thermal conductivity of coefficient, heat transfer of coefficient, passive energy houses.*

1. Introduction

The technical documentation required for achieving and realizing construction provides a site organization which must include:

- access roads;
- tools, devices;
- renewable energy;
- changing rooms, drinking water;
- graphical execution of works;
- organization of storage space waste resulty from construction activities;
- organization of storage space waste resulty from construction activities specific measurable safety and health at work, as well as prevention and firefighting;
- measures to protect neighborhoods (transmission of vibration and severe shock, large dust releases);
- realization works in accordance with quality requirements imposed by technical documents and specifications taught beneficiary;
- organizing proper execution and control works so as to avoid the occurence of nonconformities.

Environmental coordinator follows:

- improving the environmental performance;

- appropriate management of waste generated;
- reducing the amount of raw materials and utilities;
- eliminating the risk pollution.

Coordinator for safety and health:

- integrates aspects of safety at work since the design phase;
- visit the site of work;
- the design phase plan is general safety and health at work;
- generally health and safety plan at work will change whenever there is a change in your execution plan.

Workers:

- complies with the employer's instructions for quality, safety and health at work and environmental protection;
- correct use of machinery, tools, substances and equipment;
- don't remove specific safety instructions and their equipment and installations and apply them correctly;
- correct use of personal protective equipment.

2. The efficient use of renewable energy

The most important energy sources based technologies available today are petroleum, natural gas, and coal.

The concept of solar energy refers to energy that is directly caused by the transfer of light energy from the sun played.

Romania is located in an area with a high solar potential, with 210 days of sunshine per year and solar flux between 1000 kWh/m²/year-1300 kWh/m²/year. The most important solar regions of Romania are the Black Sea, Dobrogea and Oltenia.

Passive solar heating systems contain specialized elements that capture solar radiation, making its conversion into heat.

Houses that have a passive solar heating system must be built to make the most moving air stream. Thermal mass can be incorporated into the floor or walls.

The main feature of houses with passive solar heating is the thermal mass.

The ideal thickness of the material which acts as a thermal mass is 10 to 12,50 cm.

Windows can be considered solar collectors, while the walls and floor are storage tanks.

Geothermal energy

Heat pumps use natural clean resource (air, earth, water) that regenerate continuously.

Heat pumps heat so that the emission of toxic substances in living space is void.

Geothermal system is composed of 3 parts:

- heat exchanger;
- heat pump;
- the air supply system.

Wind energy

The kinetic energy of the wind can be used to train elite turbines, which are able to generate electricity.

Vertical axis wind turbines are a type of wind turbine where the main rotor shaft is placed vertically.

Among the advantages of this arrangement are that the generator and gearbox can be placed near the ground and that turbines shouldn't be positioned in the wind.

Small-scale wind turbines are generating systems with a current production capacity of up to 50 kW.

3. Insulation materials used to achieve a green building

Natural fiber insulation:

- sheep wool insulation;
- hemp fiber insulation;

- wood fiber insulation.

Sheep wool insulation

Sheep wool insulation is manufactured from natural wool fibers, washed and treated. These wool fibers are held either mechanically or using a maximum of 12% polystyrene fibers to form sheets or rolls.

Wool insulation is used as heat and sound insulation.

Wool is a hygroscopic material which means that it is designed to absorb up to 30-40% of its own weight in moisture content. Thermal conductivity is between 0,0356 W/mK-0,040 W/mK. Sheep wool insulation is fire resistant.

Hemp fiber insulation

Insulation is manufactured from hemp fiber plus 10-12% Biko fibers for excellent dimensional stability.

Recently appeared insulation that is 100% natural hemp fibers Biko optional when natural fibers are replaced with corn.

Hemp is capable of absorbing up to 20% of its weight in moisture content. Hemp fiber insulation have low conductivity of 0,040 W/mK.

Wood fiber insulation

Raw materials for manufacture of insulated panels are wood fiber waste from wood chips.

Wood fibers obtained from wood chips can be treated by up to 2% paraffin.

Then impregnated with polyurethane resin and 4% dry treatment boards harden and dry.

Given that during the manufacturing process, the sapwood is removed, fiber-wood boards aren't attacked by moths and beetles.

Below is the roof structure in wood construction.

Roofs are building elements serving the protection at the top of the building against climate action.

To perform this operation, the roof must ensure the collection and removal of meteoritic water, in order to prevent damages that may occur in their penetration into the building.

Roofs are divided into 2 groups: framing roofs, terrace roofs.

Roof framing type includes the following elements are: roof covering, elements accessories.

In fig.1 presents longitudinal framing walls for 10,00 m < L < 12,00 m.

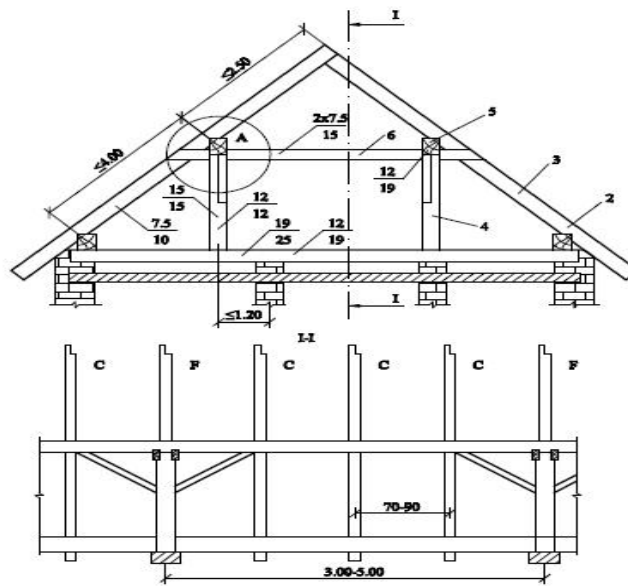


Fig.1. Longitudinal framing walls for $10,00\text{ m} < L < 12,00\text{ m}$

- 1- floor;
- 2- roof;
- 3- rafter;
- 4- truss;
- 5- roof;

6- plier ($7,5 * 15$).

In fig.2 presents framing the switch for opening $L < 8\text{ m}$.

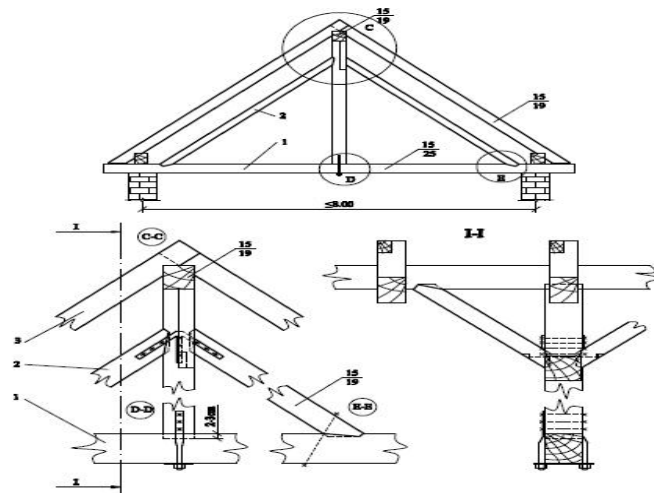


Fig. 2. Framing the switch for opening $< 8\text{ m}$

- 1- chord;
- 2- rafter;
- 3- flat steel ($10 * 50\text{ mm}$).

In fig.3 presents framing the switch for opening $L > 8\text{ m}$.

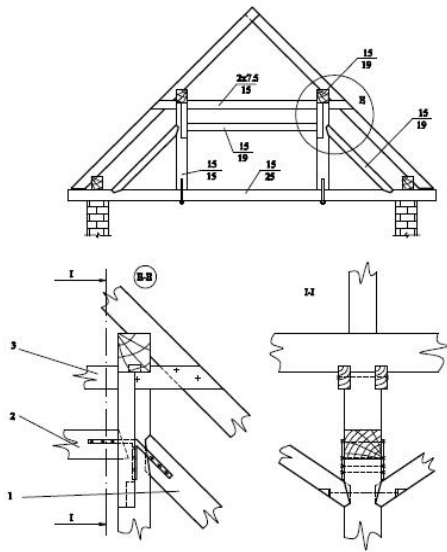


Fig. 3. Framing the switch for opening >8 m

- 1- roof;
- 2- base;
- 3- rafter.

4. Optimization structure for passive energy house

The paper has been taken to study three structures of insulation for passive energy house.

With software from German company (www.u-wert.net) were mapped graphics on temperature variation profiles coefficients from moisture and heat.

The structure of 1 taken for analysis is made of OSB/3 (thickness 18 mm, coefficient of thermal conductivity of 0.13 W / mK), OSB/4 (thickness 14 mm, coefficient of thermal conductivity of 0.13 W / mK), Agerpan OSB/3 PUR (Thickness 6 mm, coefficient of thermal conductivity of 0.13 W / mK), OSB-Platte (thickness 4 mm, coefficient of thermal conductivity of 0.13 W / mK).

Figure 4 shows the temperature variation of structure 1.

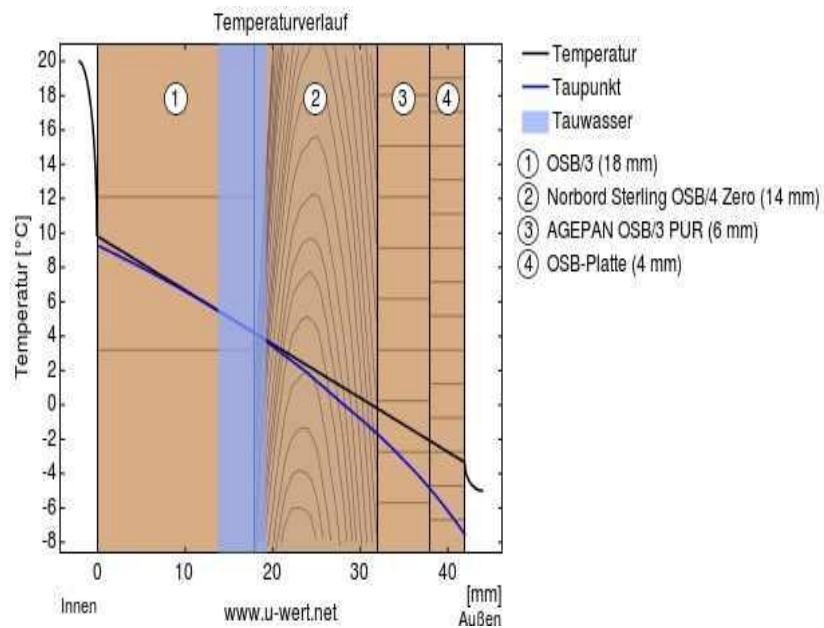


Fig. 4. Temperature variation for the structure 1

Figure 5 shows the variation in moisture for the structure 1.

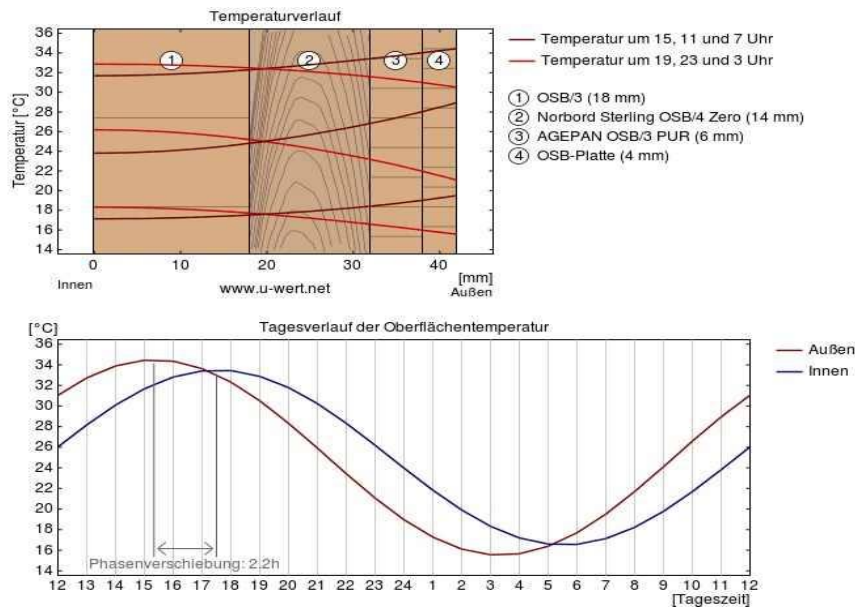


Fig. 5. Changes in moisture for the structure 1

The structure of 2 taken for analysis is made of: woodplatte (thickness 18 mm, coefficient of thermal conductivity 0.09 W / mK), wood multitherm (thickness 60 mm, coefficient of thermal conductivity 0.039 W / mK), Udiflex (thickness 40 mm, coefficient of thermal conductivity 0.09 W / mK), wood fibres (thickness 4 mm, coefficient of thermal conductivity 0.05 W / mK).

The structures of 3 taken for analysis is made of: Cem wood (thickness 13 mm, coefficient of thermal conductivity 0.11 W / mK), isonat fiberwood Duoprotect (60 mm thickness, coefficient of thermal conductivity 0.044 W / mK), wood (thickness 40 mm, coefficient of thermal conductivity 0.04 W / mK), woody cell (thickness 240 mm, coefficient of thermal conductivity 0.04 W / mK).

Conclusions

Given that structure 1 heat transfer coefficient $U = 2,03 \text{ W/m}^2\text{K}$, structure 2 is the heat transfer coefficient $U = 0,33 \text{ W/m}^2\text{K}$,

structure 3 is the heat transfer coefficient $U = 0,116 \text{ W/m}^2\text{K}$.

A low U-value indicates a high level of insulation.

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THE ROMANIAN “GREEN KID” INITIATIVE: FOOD, EDUCATION, AND FUN

L. ALEXANDRU

Abstract: *This work presents the methodology and results of the Green Kid initiatives a new approach in educational system of children. The Green Kid Food-Based Curriculum has become compulsory and part of the Montessano Kindergarten curriculum, in Bucharest. There are two weekly sessions with groups of 15 up to 23 children (ages 3 to 6). After attending the Green Kid classes and workshops, children and parents alike gradually become aware that by eating more plant-based foods and adopting a healthy lifestyle (including exercise, outdoor activities, and plenty of sleep) there are many gains to be had: increased health, increased performance at school or work, better interpersonal relations, happy families.*

Keywords: *health education, healthy eating habits, plant-based, preschoolers, nutrition*

1. RATIONALE| Why health education in the early years?

Today more and more people are convinced that Hippocrates was right: there is a strong and direct relationship between food and health. We are plagued with numerous modern illnesses and health conditions because we do not eat adequate food as children or adults. Yes, we are proud of our advanced science and sophisticated technology. However, it's always more difficult to cure than to prevent, no matter the technological advancement.

Too much money has been spent, and too many lives were wasted before we finally got to admit this fundamental truth. So it's time to focus in the right direction, because, as Frederick Douglass said, “It is easier to build strong children than to repair broken men.”

This is the most important change that we need to make: to focus on health education, because learning proper nutrition and the basis of a healthy lifestyle at an early age means building a healthier future. We all know that adults change their habits too hard and too late. Sometimes they never change.

By teaching young children to eat healthy, appreciate nature and spending time outdoors, exercising and practicing various sports, we are ensuring that they grow into healthy, successful adults, capable of making right choices. Only they can bring about the much-needed change. Therefore starting health education as early as

possible is, in fact, the most important thing to do.

2. OVERVIEW| Scientific basis for the Green Kid initiative

What is the effective way to provide this health education? How to get our children to eat more vegetables and fruits, to avoid sweet treats loaded with sugar and preservatives, to forget about their tablets and TVs and go play outdoors? This sort of fundamental education must be delivered in the proper stage of life, in a very attractive manner to be effective and to compete successfully with the unhealthy temptations of the environment. The younger the age, the easier it is to influence effectively and guide children. If we want our educational efforts to have the desired results, health education must start as early as possible.

Scientists in the field of new biology – Dr. Rima Laibow and Bruce Lipton, a renowned cell biologist – discovered that children up to the age of 6 are more susceptible to “outside programming”. Since their brain operates at a lowest EEG frequency (4-8Hz between two and six years of age), they have the ability to process a vast quantity of information regarding their environment. Small children observe parents and educators, their behaviors, attitudes, and beliefs and download all of this life wisdom in their subconscious memory.



So all of these observed fundamental beliefs about world, life, including family's eating

habits, become their own, and will control their biology for the rest of their life.



The conclusion is simple: if you have a healthy lifestyle, your children will imitate it. If you have poor eating habits today, your kids will have poor eating habits tomorrow and long afterward. These clues offered by science are essential to the success of any national health education program.

This is how we can use science in a constructive way: 1. Provide health education. 2. Start early - later will be too late. Older children are less susceptible to this outside programming due to a higher frequency of alpha waves (8-12Hz).

Now it is clear why adults find it so hard to change their habits. It's time to find out how we can provide effective education, here in Romania and anywhere in the world.

3. INTRODUCING THE "GREEN KID" INITIATIVE| Food, Education, and Fun

Based on my professional experience as a teacher and on the extensive study of developmental psychology, cell biology, and nutrition, I have voluntarily devised an attractive and efficient pilot programme for preschoolers and first graders. As founder and trainer, it is my constant concern to make this programme work.

All courses, workshops, books, and CDs entertain children while encouraging the development of healthy eating habits. I've named it Copilul Verde - "The Green Kid" - since green is the symbol of spring, rebirth, life, energy, and care for the environment.

A "green kid" is a child who learns a healthy lifestyle from his infancy, loves nature, spends a lot of time outdoors, and likes to eat fruits and vegetables. He is healthy, energetic, intelligent, and altruistic, has a strong immune system, and is ready to a happy life. The "green kids" who have followed this food-based curriculum for at least eighteen months have managed to produce lifestyle changes in their families, and this is just one of the many positive side effects.

Consequently, it is proven that we can educate parents by efficiently educating their children. Adults are more likely to accept dietary or lifestyle changes when they are parents of young children.

In a time span of three years, the Green Kid curriculum has provided effective health education. It breaks down nutrition into accessible concepts for young children and is already determining major dietary changes in

many Romanian families. Let's take a look at what some parents have to say about the project:

"This wonderful project has exceeded our expectations. Through play, children learn the principles of healthy eating and develop respect for nature so that they'll make the right decisions later in life." – Andrea Gauggel

"This is an ideal concept! It teaches small children that green nutrition is the first and decisive step towards a carefree life." – Ramona Teaca

"I was impressed by the efficient and ingenious way in which children are taught to make the right decisions regarding nutrition and lifestyle." – Elena Lazar



4. METHODOLOGY AND IMPLEMENTATION| Learning healthy habits is fun! The Green Kid in practice

Since 2012, the Green Kid pilot programmes were implemented in two Romanian kindergartens and soon they will be tried out in a Montessori school as well. The curriculum, suited to 3 - 6 year-olds, includes 32 lessons per academic year. All the lessons combine academic disciplines with food and arts, through experiential learning. The key concept of the curriculum is "Food, Education, and Fun". The program has the following goals:

- to enhance children's interest towards plant-based foods, as well as acceptance of a diverse diet
- to increase the content of raw foods in children diet
- to improve understanding of the relationship between food, active living, and health
- to develop life skills such as cooking, gardening, and smart shopping
- to build up children's esthetic sense (food art)
- to generate a positive impact on the eating patterns of the children's families.



The Green Kid Food-Based Curriculum has become compulsory and part of the Montessori Kindergarten curriculum, in Bucharest. There are two weekly sessions with groups of 15 up to 23 children (ages 3 to 6). The course combines academic disciplines with food and arts in a very attractive manner. Just to give an example, we study the benefits of carrots, but we also build

musical instruments out of carrots, we count the seeds and plant them, we learn poems and create food art images using this vegetable. As teaching materials we use exclusively plant-based foods, minimally processed, naturally low in fat and salt, high in nutrients: fruits, vegetables, greens, walnuts, seeds, algae and edible flowers.



The students perceive each lesson as a mini-show, but the messages they receive during these special lessons lay the foundations for the choices they will make later in life.

They find out new and interesting things (about botany, geography, history, math, physics, cooking techniques), while eating healthy foods and having fun (they laugh, recite, listen to stories, dance or play games). With the exception of cereal and some vegetables that require cooking, all the foods are raw and come in ideal combinations for a healthy digestion.

There's a wide variety of fruits and vegetables, nicely cut and arranged. The lesson topic – whether it's Snow, Microbes, Cabbage or Sleep – is ingeniously entwined with information about nutrition.

For example, a lesson about sleep will provide facts about the sleeping habits of animals while also stressing the importance of sleep and what types of food will ensure an easy digestion and a

restful sleep. Starting 2014, Green Kid holds workshops for adults as well.

5. RESULTS| *Green Kid is a highly efficient curriculum*

Most children said no to vegetables before attending the Green Kid classes. They didn't eat enough raw fruits and vegetables, refused green goods, were reluctant to try out new foods and consumed excessive quantities of sweets and animal products. After only three months of attending the program, parents and teachers have noticed a radical change in both attitude and behavior regarding food and eating. The more time they get to spend with us, the more stable their healthy eating habits will become. Today, these children regularly eat raw food (including very unpopular vegetables such as kohlrabi, green onion, garlic or Brussels sprouts).



They accept and even require the presence of greens in their meals, and, most importantly, they apply at home what they learn in class. Many children ask their parents to read labels carefully when shopping, request homemade sugar-free sweets, add vegetables to the shopping cart and help their parents with cooking. Green Kid parents are enthusiastic about the results, and we are happy to receive feedbacks like this: "After

only a few months of attending the Green Kid course, Matei no longer wants unhealthy sweets and makes us read nutrition labels when shopping. He knows we must avoid sugar and preservatives, and we came to the conclusion that we should make our healthy sweets at home. He even told my parents that it's wrong to wrap food in aluminum foil! Now he's ready to try out new veggies and already shows reluctance towards

several types of foods that he considers to be "suspect" (potato chips, for instance, which he finds in parks). Before attending the Green Kid, it seemed impossible that Matei would ever say no to unhealthy products, but in just a few months, his views changed radically. He expects me to read the labels and check if the food is natural. Last summer we were looking to buy some things, and the children saw the ice-cream stand. I told them I didn't think it was healthy. Matei suggested to check out the ingredients, so we stood there for about ten minutes, reading the labels of six different brands of ice-cream. Matei carefully followed each text, saying "this one isn't healthy, let's see another one". In the end, we all agreed to go home without buying anything, and make healthy ice-cream ourselves. It was quite a fascinating sight for all the people in the store!" – Catalina Iordache.

It's a fact. After attending the Green Kid classes and workshops, children and parents alike gradually become aware that by eating more plant-based foods and adopting a healthy lifestyle (including exercise, outdoor activities, and plenty of sleep) there are many gains to be had: increased health, increased performance at school

or work, better interpersonal relations, happy families.

The first book is *Yummy Stories*, a collection of six folk tales encouraging healthy eating habits. The book was published in the United States in December 2014, has received excellent reviews from prestigious literary critics and won three international awards. The Romanian edition (*Poftă de povești*- paperback with audio book) will be released in June 2015.

"A brilliant way to encourage kids to eat their veggies!"-Epic Book Quest.

"A cheerful, fun approach to good food with the authentic flavor of folk tales for kids 4 to 8." – Kirkus Reviews.

"*Yummy Stories* is a yummy book indeed, and it is most highly recommended." - Readers' Favorite. *Yummy Stories* has been selected among the best in family-friendly media, products and services by the Mom's Choice Awards®. The annual Beverly Hills International Book Awards® included *Yummy Stories* in the category of Picture Books Ages 4-8 as Winner, and Finalist in the Children's Inspirational category.



Beginning with April 2015, a stunning *Yummy Stories* audio book will be available to children and parents worldwide.

The Green Kid – Copilul Verde - collection will include many more story books, poetry books, and CDs which will encourage the development of healthy eating habits that will last a lifetime.

All Green Kid editorial projects are designed to:

- to spark children's imagination (through adventures in the wild, believable characters);
- to inspire children to learn about natural food (life cycle of plants, gardening, pollination);
- to help develop social skills (sharing, helping, cooperation);

- to help children think, form judgments, make decisions, and values to increase children's interest and acceptance of a more diverse diet and even to stimulate the appetite for vegetables and fruits.

6. CONCLUSIONS AND PERSPECTIVES| We need more projects and initiatives like Green Kid

If we take a close look at children's diet today, we notice a combination of deficiency and excess. First of all, children don't eat enough vegetables, greens, and raw food, being instead prone to eating a lot of animal products, sugar, salt, fat and unnatural ingredients. They're highly inactive, dependent on technology and gadgets,

and showing no interest in real books or sports. While engaged in television watching and tablet games, kids are not spending enough time in outdoor games or physical activities. Television and gadgets lead to sleep deprivation, loss of short-term memory, diminished ability to organize thoughts and trouble with speech development. Therefore, these children will always be tired and consequently irritable, frustrated and depressed. It's a fact. In many cases, advertising and television are not our true friends. TV programs encourage sometimes bad eating habits and poor nutrition: drinking bottled juice instead of eating a real orange, or eating fast food instead of homemade food. That's why we need to encourage children to spend more time

outside, to work out, and to spark their appetite for books and reading. We need fun lessons and workshops, attractive and engaging activities, well-written books, hard-working and talented teachers, and well-meaning parents, to be able to compete successfully with the unhealthy environment. Food education plays a crucial role in maintaining health and preventing disease for every nation. Food education must become a central concern for public education. It must begin at an early age, and must be done in an efficient manner. Let's not forget that the most efficient way to provide food education is to work with children up to six years of age, in a fun way, like the Green Kid chose to do it.



"I truly hope this project will reach as many parents and children as possible, contributing to the development of a new generation of healthy kids. I support the Green Kid!" – Maria Varga, nutritionist-dietitian.

Our children's future quality of life depends on what they learn at an early age about proper nutrition. Eating the right foods as a child helps build a better life for the future adult. Healthy eating habits needs to start early. Support initiatives and programmes as Green Kid, support food and nutrition education of young children and make a better future!

About the author:

Luminița Alexandru is a teacher, award-winning author (with the pen name Lil L. Alexander), food artist, organic gardener and mother of two. She conducts children's workshops on the relationship between food and

health. She firmly believes that a healthy lifestyle starting with the child's first day of life has an enormous impact on physical and mental well-being. Luminița Alexandru is the founder of Copilul Verde – "Green Kid" - the most efficient Romanian health education programme for young children.

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Prof. Romulus GRUIA, PhD - Romanian Academy Award

The Romanian Academy Board decided to confer the 2014 Romanian Academy Award to Mister ROMULUS GRUIA for the group of scientific works (collectively) „Biodiversity of the farm animals and eco-bioeconomics significances in the food security context”



Inmânare de către vice-președintele Academiei Române
Acad. Cristian HERA



Premiul Gheorghe Ionescu - Șișești

MONTANOLOGY

Within the Romanian Academy, through the „Costin C. Kirişescu” National Institute of Economic Research, in December 2015 there took place at Vatra Dornei the ceremony of the official opening of the Scientific Research Center CE-MONT, with which the Transilvania University from Brasov has a cooperation through the Research Center EBIOTEFA from ICDT / Work point of the Romanian Academy, on behalf of which participated at the event Mr. Prof. Romulus GRUIA, PhD and Mr. Prof. Liviu GACEU, PhD:

MOUNTAIN ECONOMY CENTRE „CE-MONT”

- **Research - Development and Innovation for increasing economic competitiveness of the Romanian Carpathians**
- **Fundamental, theoretical and applied - multi, inter and transdisciplinary research in the specific economic and social fields of the mountain areas**
- **Contributions to the development of a mountain culture in the society**



