BIOHARMONIZED EATING AND ASSOCIATED FOODS: A NOVEL INTEGRATED CONCEPT FOR MULTILEVEL FOOD QUALITY ASSESSMENT

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Abstract. *This paper proposes the integrated concept of Bioharmonized Eating and Bioharmonized Food as a novel framework for the multilevel assessment of food quality and value. The conceptual framework extends the conventional, predominantly energy-nutritional approach based on* ***Energy–Substance (E–S)*** *by explicitly introducing* ***Information (I)*** *and the* ***Information–Energy–Substance (I&E&S) Matrix****. Food is therefore assessed not only through its composition and nutritional value, but also through the dynamic relationship among food, the food act, the organism, diet, and the food system.*

The proposed ***Multilevel Bioharmonized Assessment (MBA)*** *integrates the characteristics of food, the food act, meals, dietary patterns, and food systems and introduces a set of original indicators: the* ***Food Bioinformation Index (FBiI), Bioinformational Density of Food (BiDF), Food Biohomeorhesis Index (FBhI)****, and the composite* ***Bioharmonized Food Quality (BFQ)*** *indicator. The I&E&S matrix hypothesis conceptualizes the food act as a process through which the informational, energetic, and substantial matrix of food is restructured and integrated into the organism's I&E&S matrix, through processes conceptually associated with biohomeoresis and the tendency toward bioharmony.*

A prospective component of the study concerns the ***market valuation of bioharmonized foods****, by relating their monetary market price to their bioharmonized performance. The paper proposes a gradual transition from market price as monetary value toward a broader* ***bioharmonized economic value****, through the progressive recognition and internalization of nutritional, bioinformational, biohomeoretic, ecological, and systemic qualities. Thus, the bioharmonized price is conceived not as an administratively imposed price, but as a progressive economic expression of additional quality that can be measured, certified, and communicated to consumers.*

The proposed approach establishes a conceptual bridge between ***food quality, food bioinformation, biohomeoresis, bioharmony, and food economics****, enabling the simultaneous assessment of monetary value and bioharmonized value.*

Keywords: Bioharmonized Food; bioharmonized diet; food quality; food bioinformation; Food Bioinformational Density (FBD); Bioharmonized Food Quality (BFQ); bioharmonized price.

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Introduction

Nutrition is a fundamental component of human existence, situated at the intersection of biology, health, economics, culture, society, and the environment. Within the contemporary agri-food system, food is analyzed primarily in terms of its compositional, energetic, nutritional, microbiological, and safety characteristics, while its economic value is expressed mainly through market price. Although these forms of assessment are indispensable for the functioning of modern food systems, the complexity of the relationship between food, the human body, nutrition, and the environment in which they evolve calls for an approach that goes beyond the isolated evaluation of individual components. For a truly objective analysis, it is useful to consider the conceptual evolution of dietary practices (Table 1).

Table 1. Evolution of the eating & nutrition paradigm

STAGE	PERIOD	SPECIFICS	CONCEPTUAL VALUE
Nutrition 1.0 • ***The caloric paradigm***	19th Century	Food is energy. Indicator: kcal	Focus: energy metabolism
Nutrition 2.0 • ***The nutritional paradigm***	20th Century	Food is: energy; proteins; carbohydrates; lipids; vitamins; minerals.	Model: Energy + Substance
Nutrition 3.0 • ***The biofunctional paradigm***	The transition from the 20th to the 21st century	Emerging areas include: the microbiome; nutrigenomics; metabolomics; epigenetics; bioactive compounds.	It is acknowledged that biological structure and organization influence the effects of foods.
Nutrition 4.0 • ***The bioharmonist paradigm***	21st Century	Food, too, is part of the complementarity of the ontic triad: *Information & Energy & Substance*	Nutritional bioinformation is the conceptual contribution proposed by the bioharmonism paradigm.

In light of the above, we observe a number of significant implications within the EU Commission itself as it prepares "Food 2040" through a European consultation process. We are referring to the explicit references to the need for SYSTEMIC APPROACHES, measurable impact, and the translation of research results into policy, practice, and the market.

It is evident that, in recent decades, food system research has evolved from a predominantly quantitative and energy-nutritional assessment toward a

multidimensional approach that simultaneously encompasses health, nutritional quality, environmental sustainability, economic accessibility, social equity, resilience, and consumer behavior. However, these dimensions are still frequently analyzed using relatively separate frameworks and indicators, and integrating them into a unified concept of food value and quality remains a scientific and methodological challenge. Against this backdrop, we address the assessment of food quality, which—as is well known—relies on numerous sectoral indicators regarding nutritional composition, energy value, nutrient density, safety, bioavailability, degree of processing, functionality, environmental impact, and sustainability.

In light of this premise, the approach proposed in this paper is one of complementarity and anticipation—*not* substitution—regarding the existing European framework. We refer to a **multi-level approach** concerning the interactions and emergent properties that arise when a high-quality food (possessing both energetic-nutritional and informational value) is *integrated* into the act of eating. We analyze this ***integration*** across different dimensions (within a menu, a dietary pattern, or a comprehensive food system) and through a multi-level scope that encompasses complementary quality criteria and is expressed via specific indicators described in the paper. To clarify terminology: ***"multi-level"*** refers to administrative, structural, or power hierarchies; ***"multi-scalar"*** concerns spatial or temporal dimensions; and ***"multi-dimensional"*** analyzes the various facets or variables of a phenomenon. The aforementioned dynamic (Table 2) is expressed—within the concept of bio-harmonism—through the process of bio-homeorhesis. We define **biohomeorhesis** as the dynamic, evolutionary process by which a living system transforms disturbances, imbalances, and entropic tendencies into adaptive reorganizations, thereby maintaining or restoring the system's functional and relational coherence [21, 24].

Table 2. Levels of the biohomeorhesis process monitored through the bioharmonist paradigm

LEVEL		MANIFESTATION OF BIOHOMEORHESIS
L.1	= molecular	➢ biochemical regulation and self-regulation
L.2	= cellular	➢ cellular adaptation and reorganization
L.3	= organismal	➢ integration of organism functions
L.4	= population	➢ adaptation and co-regulation
L.5	= ecosystem	➢ regulation of relationships between components
L.6	= societal	➢ adaptation of institutions and their behaviors
L.7	= planetary	➢ civilization–biosphere relationship
L.8	= cosmic	➢ integration of the living system into cosmic environmental dynamics

Thus, the process of BIOHOMEORESIS becomes a procedure and a connecting tool between levels—serving a restructuring and bioharmonizing role—rather than merely an internal process of the organism.

Building upon modern trends in nutrigenomics and systems biology—as well as other compatible perspectives—we propose approaching the act of eating and its components through the ***paradigm of Bioharmonism***. We note that Bioharmonism can be presented as an extension of the sustainability paradigm, grounded in the integration of the bio-informational dimension and biohomeorhesis into the assessment and design of food systems.

We are referring specifically to an expanded approach to the concept of *Information (I)*—one that goes beyond the usual reduction to digital data or genetic code. In the context of this topic, it can be understood in an integrated manner as "bioinformation" (a relevant concept, though not yet universally established): the set of organizational and functional characteristics that endow a foodstuff with specific biological properties. Examples include the genetic diversity of the biological resource, tissue structure and organization, bioactive compounds, the food matrix, associated microbiota, and the degree of processing and preservation of the natural structure. Consequently, we consider "FOOD BIOINFORMATION" to be an appropriate term, as food provides not only calories but also active genetic and metabolic messages (many as yet unsuspected), acting as an amplifier or degrader of information throughout the farm-to-fork chain—spanning soil, genetics, processing, and preparation.

The primary **objective** of this work is to establish the foundations and structure of the "Bioharmonized Nutrition" concept and to propose an integrated framework for assessing food quality. Specifically, the study aims to: (i) clarify the conceptual relationships between nourishment, food, the act of eating, nutrition, and food systems; (ii) establish the complementarity between the energy-nutritional and bioinformational dimensions; (iii) define an indicator architecture comprising *ENI, FBiI, BiDF, and FBhI*; (iv) substantiate the *BFQ meta-indicator*; (v) explore the applicability of this framework to individual food items, dietary configurations, and agri-food systems; and (vi) identify the research directions required for the operationalization and empirical validation of the proposed indicators.

The conceptual **novelty** of this approach lies in the ***introduction of "bioinformation" as a complementary, explicit***, ***and measurable dimension of food quality***—alongside energy and substance—and in linking it to the process of *biohomeorhesis* and the concept of *bioharmony*. Thus, the work proposes a transition from a predominantly energy-nutritional representation [E-S] to an integrated representation [I&E&S] aimed at achieving bioharmony:

[*I & E & S*] ⟶ Biohomeorhesis ⟶ Bioharmony

Looking ahead, this approach may also contribute to a reconsideration of the concept of **food value**. While economic assessment primarily reflects a food's market value, bioharmonized assessment targets a **multidimensional value** that—beyond the monetary dimension—may encompass resource-use efficiency, energy-nutritional value, bioinformation, biohomeorhetic potential, and the contribution to food system sustainability.

Literature review

The bibliography for the topic at hand extends beyond a mere nutritional bibliography, as it must support the **four stages** of the argument: *food quality → food matrix → diet quality and sustainability → the need for an integrated assessment.*

In the literature concerning the food matrix, structure, digestion, and bioavailability, there are pertinent references to the food matrix as a physiological interface between food and health [1, 7, 14, 29, 31].

Regarding nutrient density, the density and nutritional profiling along the E-S dimension are relevant [8,9,11]. Insights into the use of various indices can be found in the literature [10,12]. With respect to food quality [2] and the quality of specific menus and diets, the literature describes over 80 indices [30,40,41], while also addressing aspects of global food security [4,27]. The factors underpinning these issues—which influence regulatory processes and systemic harmonization—are strongly supported in the analyzed literature, ranging from biodiversity to the impact of pollution on health [3,5,13,18,28,32,37]. We also note the guidelines provided by global organizations regarding health assurance through dietary habits [45,51].

Analyses conducted within the framework of integrated health-environment-economy assessments [49] comprehensively illustrate the relationship between these factors and the food system [33, 35, 36, 39]. The concept that food assessment is shifting towards a ***multi-criteria*** and ***sustainability***-oriented approach is explored in depth; however, integrating these various dimensions presents challenges regarding weighting, comparability, and aggregation [6, 25, 26, 34, 38]. Key references in this study include those that explicitly define the need to combine health considerations with sustainability, economic affordability, and socio-cultural acceptability [42, 44, 47]. This increasingly comprehensive approach is reflected in studies addressing integrated food systems [43, 46, 48, 50, 52, 53].

It is evident that the literature has already progressed from food composition to nutrient density, from nutrient to food matrix, from food to diet quality, and subsequently toward the integration of health, sustainability, economics, and the

sociocultural context. We have contributed to this area through our recent research at the BIOSALT Study and Research Center [15, 16, 17, 19, 20, 23].
The Bioharmonist paradigm proposal [21, 22] introduces an additional step—namely, the representation of food via the *I&E&S Matrix* and the conceptualization of bioinformation as an integrating dimension—followed by an analysis of the biohomeorhesis potential and emerging bioharmony [24].

1. Materials and Methods

The analysis was conducted using principles of multi-criteria analysis, comparisons, and statistical processing. Structurally, the research methodology relies on an extensive review of specialized literature, legislation, and public policies regarding food security and governance typologies at both national and European levels. This research is *exploratory-descriptive* in nature, incorporating elements of both qualitative and quantitative analysis. A mixed-methods approach was adopted to capture both objective (quantitative) data and subjective, contextual (qualitative) perspectives. The bibliography extends beyond the scope of nutrition alone, as the study required an approach encompassing four argumentative stages: *food quality → food matrix → diet quality and sustainability → the need for an integrated assessment.*

2. Results and Discussions

We consider a few conceptual-semantic clarifications useful: food is the object; the act of eating is the action; nutrition (or feeding) is the process; and the food system is the systemic framework that produces, conditions, and sustains the process. Furthermore, we consider the processes through which food systems evolve to be linked to the concept of biodevelopment:

The biodevelopment of food systems refers to their evolution across five stages and levels: from productivity to integrated quality; from quantity to informational value; from entropy to biohomeorhesis; from exploitation to regeneration; and from quantitative food security to bioharmonized food security.

Biodevelopment is, in essence, *a **mode of development*** that—through the intelligent utilization of biodiversity—simultaneously yields better food, healthier people, a more robust natural environment, and more prosperous communities. It manifests primarily through the process of bio-harmonization. **Bioharmonization** is the ***systemic process*** by which biological information is preserved, amplified, and efficiently transferred throughout the entire agri-food chain. It is a process

that enables organisms and ecosystems to maintain and adapt to their natural functional balance amidst constant change (biohomeorhesis). Consequently, they become more resilient to change and more capable of recovery, possessing the ability to harmonize the relationships between systemic components.

In light of the foregoing, the paper proposes the concept of BIOHARMONIZED NUTRITION (grounded in the paradigm of Bioharmonism) as an integrated, multi-level approach to the relationship between food, the act of eating, the organism, and the food system

The central premise is that food should not be viewed solely as a source of energy and nutrients, but rather as an ***integrated matrix of information, energy, and substance (I&E&S)*** that enters into a dynamic relationship with the organism during the act of eating. From this perspective, the energetic and nutritional dimension of food remains fundamental but is **complemented** by a dimension linked to biological information (a bioinformational dimension)—specifically, the relevant biological, structural, and functional characteristics of the food matrix and the potential of its components to participate in the food-organism interaction.

The study's working hypothesis is that integrating the bioinformational dimension alongside the energy-nutritional dimension can enable a superior level of understanding and quality assessment regarding the specific interrelationships of the food matrix network (M)—which, as previously noted, is expressed through the interpretation of the I&E&S ontological triad.

Empirical observations indicate that the process is not merely a mechanical transfer of food components, but rather a ***dynamic restructuring of the relationships between information, energy, and substance***—a process contingent upon the organism, the context, and dietary interactions. Specifically, we analyze this process as a restructuring dynamic interpreted through the concept of biohomeorhesis. **Biohomeorhesis** represents the dynamic-evolutionary process of integration, regulation, and adaptation within a living system; in the context of this study, it serves to operationalize the link between food characteristics and their potential contribution to *systemic bioharmony.*

Building on this premise—including the standard "energo-nutritional" (ENI) approach—this paper proposes an evaluation framework in which the energo-nutritive dimension is integrated with the informational dimension, represented by several specific indicators. These include the ***Food Bioinformation Index*** / FBiI (the primary level of characterizing a food's informational component); ***Bioinformational Density of Food*** / BiDF (an expression of the concentration of a food's bio-informational dimension relative to a reference unit, complementing energy and nutrient density); the ***Food Biohomeorhesis Index*** / FBhI (conceptually enabling the shift from the intrinsic evaluation of food to a

relational food–organism evaluation via potential biohomeorhetic integration); and ***Food Bioharmonized Quality*** / FBQ (a meta-indicator of the new framework that integrates energo-nutritive, bio-informational, and biohomeorhetic dimensions into a multi-level assessment). All of this leads to the proposed evaluation, which can be schematically represented by the following relationship:

$$\boxed{ENI + FBiI + BiDF + FBhI \rightarrow FBQ}$$

It should be noted that this framework does not aim to replace established nutritional and food safety indicators, but rather to *complement* them by introducing a new conceptual and operational dimension. Although these dimensions may appear similar, their interpretation can be nuanced through in-depth study; therefore, we adopt a three-perspective approach: *"multi-level"* (i.e., comprehensive, relating to administrative or power hierarchies), *"multi-scalar"* (referring to spatial or temporal dimensions), and *"multi-dimensional"* (when analyzing the various facets or variables of a phenomenon).

In this work, the **bioharmonized approach** proposes shifting from a focus primarily on food composition to an evaluation of the relationships between composition, bioinformation, interaction, and biological integration. This allows for the objective assessment of ***quality*** across different levels—going beyond the mere sum of the qualities of individual components. This perspective leads to a **multi-level concept of quality**, where evaluation can begin with the food itself and extend to the meal, the diet, the individual, and ultimately to the food system and society. Within such a framework, bio-harmonization becomes a *process of progressively correlating* the flows of information, energy, and matter across the system's various levels.

The information presented reveals a difference in approach compared to the classical one, as summarized in Table 3.

Table 3. Difference between the proposed approach and the classical approach

Classical approach	Bioharmonized approach
• Calories	• biological information
• nutrients	• bioinformation
• food safety	• nutritional biohomeorhesis
• chemical composition	• sustemic organization
• yield	• biological harmonization
• food	• information system

2.1. The bioharmonization process

The process described allows for the interpretation of **quality** within the food system through differentiated modes of expression. Thus, we can identify the *CONVENTIONAL EXPRESSION OF FOOD QUALITY* through its ***energetic*** and *nutritional (substances)* dimensions (E–S). While fundamental to characterizing food, this approach does NOT fully capture the complexity of the relationship between [Food and Organism] & Environment.

$Q_{E–S}$ = quality assessed via standard energy and nutritional indicators

IN-DEPTH COMPLEMENTARY ASSESSMENT based on the **bioinformational dimension (I)—**evaluated additionally and holistically within the **Information–Energy–Matter/substances (I&E&S) matrix**—can provide the *next level* of understanding and evaluation regarding food quality; specifically, it highlights the relevant biological information intrinsically linked to the food's structure, composition, biodiversity, processing, bioavailability, and interactions with the organism. This constitutes a comprehensive assessment of food quality:

$Q_{I–E–S}$ = quality evaluated through *multilevel I & E & S* integration

In this relationship, the evolutionary dynamic is sustained by **biohomeorhesis**, which is essentially the process of multilevel reorganization through which the living system transforms disturbance into evolutionary continuity.
Within the matrix structure, BIOHOMEORESIS represents not merely the Information (I) component, but the functional effect of biological information integrated with energy (E) and substance (S). Essentially, based on this process, the **multilevel food matrix** can influence the stability, absorption, and bioavailability of bioactive substances (e.g., phytochemicals), given that processing can alter these relationships. This perspective is particularly significant for the hypothesis of the present study, as it enables a conceptual transition along the following flow:

nutrient → food → food matrix → food–organism interaction

Consequently, FOOD is no longer viewed merely as a "container" of nutrients, but as an organized system of components linked by ***structural and functional relationships***. Thus, "food" is the carrier of the **I&E&S Matrix**, the "act of eating" is the transformation operator, "nutrition" is the temporal organization of these transformations, and ***"biohomeorhesis"*** represents the operational link between food (the matrix) and nutrition (bioharmony).

In the multilevel approach, the bioharmonization process unfolds based on specific principles—listed here to illustrate the process's complexity, though not detailed, as they form the subjects of various *BIOSALT Center* studies: - preservation of biological information; - minimization of informational entropy; - maximization of biohomeorhesis; - optimization of trophic-nutritional biodiversity; - integration of information, energy, and substance; - ecological compatibility; - metabolic adaptability; - food system resilience; - bioinformational traceability; - multigenerational sustainability.
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2.2. Multilevel Bioharmonized Assessment Methodology (MBhA)

The MBhA Methodology can be characterized by a series of principled and pragmatic approaches (multilevel nature – I&E&S integration – complementarity – quantification – comparability – validation), as well as by specific indicators.

MULTILEVEL ASSESSMENT is based on a function involving *"n"* variables, wherein the emergent nature of food quality arises from a systemic integration evaluated across **five levels** of approach: food item, act of eating, meal/menu, dietary pattern, and food system. Consequently, the ***quality of the diet*** can be viewed not as the mere sum of food qualities, but as a function expressing quality (Q) in the form: $\mathbf{Q_{diet} = f\,(Q_{food},\ Q_{acts},\ Q_{actions})}$.
The new methodology does not eliminate classical indicators but integrates them into a broader architecture based on specific indicators, as previously noted. For clarification, we refer to the following aspects: the Energo-Nutritional Index (ENI) answers the question: *"What energy and nutrients does it provide?";* the Food Bioinformation Index (FBiI) addresses: *"What bioinformational potential does it possess?";* Bioinformational Density od Food (BiDF) refers to*: "How dense is this potential within a unit of food?";* the Food Biohomeorhesis Index (FBhI) relates to the process addressing: *"How can the [I & E & S] matrix interact with the organism?";* and finally, we can assess the Bioharmonized Food Quality (BFQ), which indicates the resulting ***integrated quality***.

When evaluating the indicators, normalization and aggregation are necessary to enable the comparison of variables expressed in different units, thereby transforming the indicators into a common scale, as shown in Table 4.

Tabelul 4. Typology of specific indicators regarding bioinformation complementarity in bioharmonized nutrition

INDICATOR	ROLE IN EXPRESSING BIOHARMONIZATION	BASIC FORMULA
Energo-Nutritional Index (ENI) / primary indicator	The capacity of a food to simultaneously provide metabolic energy and essential nutrients in a bioavailable and balanced form, representing the ***Energy*** + ***Substance*** (E + S) component of food quality.	$ENI = w_E E_n + w_N N_n + w_B B_n$ where: E_n = normalized energy value score; N_n = normalized nutritional value score; B_n = nutrient bioavailability score. $w_E+w_N+w_B = 1$
Food Bioinformation Index (FBiI) / primary indicator	It expresses the intrinsic quality of the ***bioinformation contained in a food*** and its capacity to participate in the organism's regulatory and biohomeorhetic processes, representing the Information (I) component of food quality.	$FBiI = w_1IS + w_2IC + w_3IB + w_4IP + w_5IF$ where: **IS** = structural integrity; **IC** = biological complexity; **IB** = biological biodiversity; **IP** = processing impact (inversely proportional to degradation); **IF** = biological functionality.
Bioinformational Density of Food (BiDF) / derived indicator / primary indicator	It expresses the ***concentration of bioinformation*** relative to a unit of mass, energy, or serving.	$BiDF = FBiI \{B\}\{E\}$ where: **FBiI** = Food Bioinformation Index; **B** = bioavailability coefficient (0–1); **E** = energy (kcal/100 g), normalized.
Food Biohomeorhesis Index (FBhI) / functional indicator	It expresses the organism's ***biological response*** to the integration of information, energy, and substance.	$FBhI = w_1FBiI + w_2ENI + w_3BiDF$ Where: $w_1+w_2+w_3 = 1$
Bioharmonized Food Quality (BFQ) / meta-indicator	Summarily evaluate the overall performance of the food, feed, or diet.	$BFQ = w_1ENI + w_2\ FBiI + w_3BiDF + w_4FBhI$ with the restriction: $w_1 + w_2 + w_3 + w_4 = 1$

As a general observation, a food item may possess an excellent energo-nutritional profile, yet another might achieve a higher bioinformational score under the proposed model; this demonstrates the value of the new approach by showing how foods that appear relatively similar in terms of "E–S" can become qualitatively distinct when the "I" dimension is introduced.

A simulation (for illustrative purposes) yields several calculation examples in which the proposed formulas are applied to derive the new expression of the **multilevel quality of foods** (tables for all food groups are to be finalized precisely as research continues). As a methodological demonstration, we use six staple foods from different food groups: whole-grain oats, lentils, eggs, apples, milk, and fatty fish (Table 5).

Table 5. Application for highlighting the meta-indicator regarding Bioharmonized Food Quality

Food (100 g)	**Energy (E)**	**Energy-nutritional profile (E-S)**	**Indicators of food bioinformation complementary**			**Bioharmonized Food Quality - BFQ (multiscalar)**	
	kcal	ENI	FBiI	BiDF	FBhI	BFQ	BFQ – ENI = bioinformational input
Apple	52	**62**	80	78	76	**78**	**+ 16**
Whole-grain oats	389	**82**	84	82	80	**82**	**0**
Lentils	116	**78**	88	86	84	**85**	**+ 7**
Whole milk	61	**76**	74	73	72	**74**	**- 2**
Egg (large)	143	**84**	86	85	83	**84**	**0**
Fish (oily)	208	**86**	91	89	88	**89**	**+ 3**

NOTE: To ensure the method is reproducible and applicable, the next step is to create a **"Calculation sheet"** for each of the *S* and *I* components (*E* represents existing values), comprising: ***primary variable → unit of measurement → data source → normalization method → weight → score → aggregate score***.

An analysis of the relationship between the energo-nutritional profile and bioharmonized quality reveals certain differences (e.g., apples, lentils), where the bioharmonized value is significantly higher; a somewhat larger difference is observed for fatty fish, whereas for milk, the bioharmonized quality is lower than the energo-nutritional standard. There are also instances where the values appear similar (e.g., oats, eggs).

2.3. Interpretation of the bioharmonized price via value tiers

The most important pragmatic aspect concerns the ***price correlation*** between the current market price (based on standard quality and market demands) and the price reflecting multi-scalar integration, as expressed by the bioharmonized value (Fig. 1).

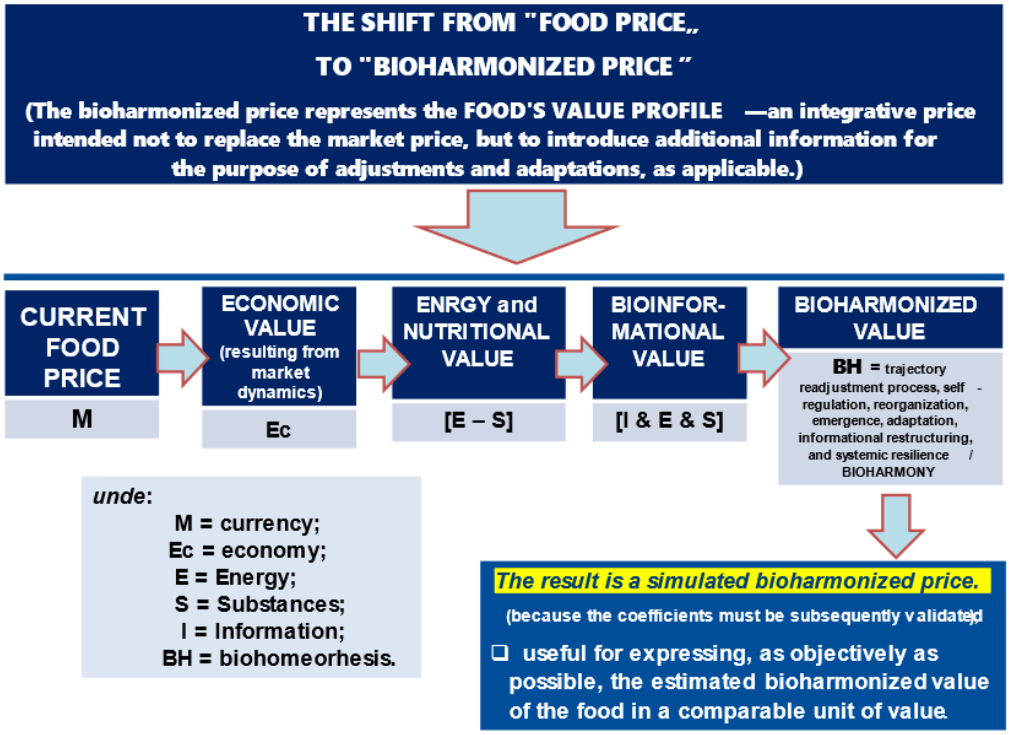


Figure 1. Price correlation regarding the multi-level quality of bioharmonized foods.

Based on the elements shown in Figure 1, a coherent architecture emerges, featuring indicators currently undergoing experimental validation, namely:

E–S → describe what is provided by food;
I → introduces the bioinformational dimension;
I & E & S → describes the multi-level integration of the dimensions considered;
Biohomeorhesis → explains the dynamic process of integration and adaptation;
Bioharmony → expresses the targeted emergent property;
BFQ → offers the possibility of an integrated evaluation of the results regarding the quality of bioharmonized foods.

To transition from a one-dimensional value to a multi-scalar one, a very interesting idea (currently under testing) would be *not* to artificially convert bio-harmony into monetary units (lei), but rather to construct two parallel values: monetary value (MV) within the standard economic paradigm and bioharmonized value (BHV) within the bioharmonism paradigm. The bioharmonized value encompasses the Bioharmonized Food Value (BFV)—estimated via a function with *seven* variables reflecting the multidimensional nature of bioharmonized food quality, namely: $BFV = f(M, E, S, I, BH, BA, SYS)$, with details provided in Table 6.

Table 6. Components of the value matrix in bioharmonized eating / nutrition

No.	Multilevel dimension	Variable symbol	Explanatory questionnaire	Unit / indicator
1	Monetary	***M***	*How much does it cost ?*	Lei/kg, €/kg
2	Energetic	***E***	*How much energy does it provide ?*	Kcal / KJ
3	Substanțial	***S***	*What nutrients does it provide ?*	g, mg, µg
4	Bioinformational	***I***	*What relevant information does it contain ?*	FBiI ; BiDF
5	Biohomeorhetic	***BH***	*How does it play a role in the food-organism relationship ?*	FBhI
6	Bioharmonized	***BA***	*What is its integrated value ?*	BFQ
7	Systemic	***SYS***	*What contribution does it make to the food system ?*	Composite indicator

Following normalization, weighting, and aggregation, the values for the composite indicators are calculated according to the employed methodology, completing the ***transition to the integrated nutrition process***: $\mathbf{BFV_{food} \rightarrow BFQ_{nutrition/diet}}$. It should be noted that the economic dimension is included within the scope of the bioharmonized nutrition approach; consequently, the ***integrated value*** is estimated using the following function:

$$BFV = f(M, BFQ)$$

From a methodological standpoint, applying the *BFV equation* reveals differences in quality among various bioharmonized foods (Fig. 2).

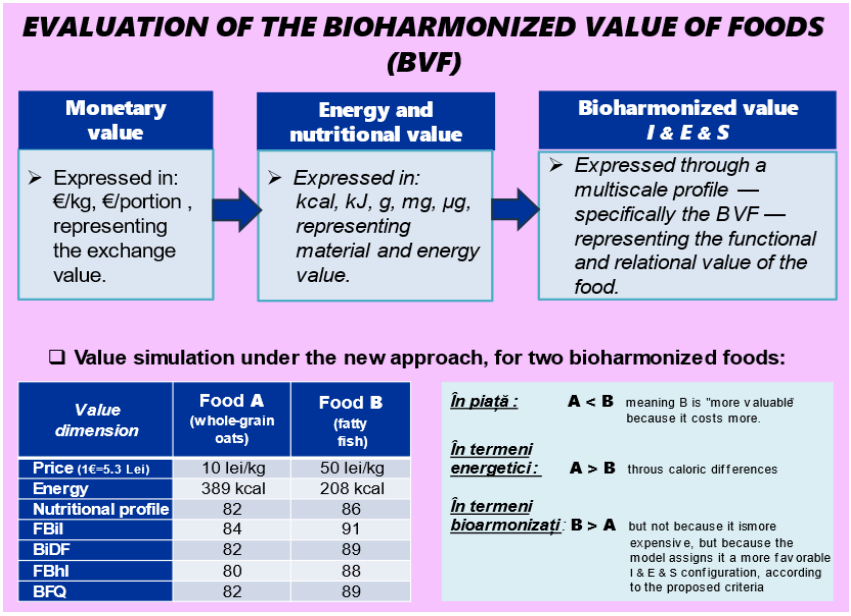


Figure 2. Example regarding the interpretation of the qualitative value of bioharmonized foods

Based on the information presented, an innovative analysis within the market economy can be conducted—specifically, a comparison between the **Food market** and **Bioharmonized value**. This analysis focuses on the relationship between Bioharmonized Food Quality (BFQ) and Price (P). Thus, a relationship of BFQ↑ and P↓ indicates a food product with high bioharmonized value and good economic accessibility—qualifying it as a strategic bioharmonized food. Conversely, the scenario of BFQ↑ and P↑ implies high bioharmonized value but limited accessibility. Finally, the combination of BFQ↓ and P↑ represents a situation where the market price is high, yet lacks a commensurate level of bioharmonized performance.

To avoid arbitrary price increases and to accurately and consistently assess the simulated difference between monetary value and the additional economically recognized bioharmonized value, an analysis presenting a **new "Price–Quality" matrix** is appropriate. As a strategic necessity for a gradual transition from market price to a price reflecting the bioharmonized quality value, the dynamics of price (P) in relation to the food's bioharmonized quality (BFQ) can be schematized using a four-quadrant matrix (Fig. 3).

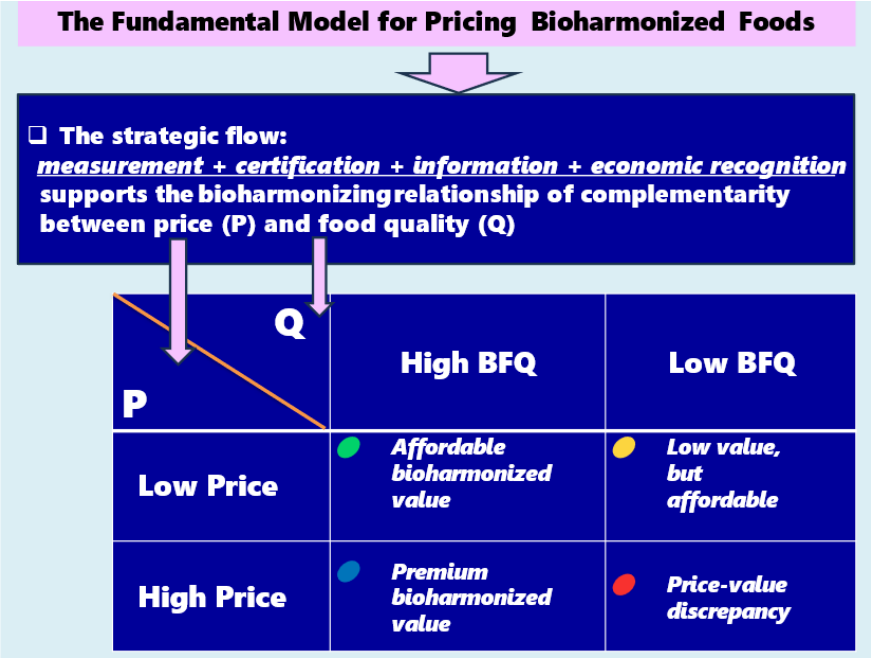


Figure 3. Price-quality (P-Q) dynamics enabling the consumer to discern value and make a comprehensive comparison: *price → quality → bioharmonized value.*

Ensuring food quality—and assessing it as objectively and accurately as possible in terms of price—is essential to articulating the **bioharmonization process**, which is grounded in the relationship between technology and quality. The value tiers within the

bioharmonized nutrition concept and the associated foods (which are energetically and nutritionally balanced as well as bioinformationally harmonized) combine classical scientific nutrition (optimal macronutrient and micronutrient intake) with holistic, ecological, and metabolic approaches, thereby ensuring systemic coherence among „Humans, Technology, and Nature". This entails a complementarity of processing levels: ranging from a state as close to natural as possible (e.g., rich in biophotons) to gentle processing based on biological and biotechnological methods that preserve the integrity of bioactive substances.

Consequently, the study outlines a new framework that involves supplementing the market's economic mechanism through the progressive internalization of food value — an aspect not currently reflected in price— specifically by integrating energo-nutritional value with bioinformational, biohomeorhetic, ecological, and systemic values. This concept can serve as the foundation for a new generation of research, quality standards, food technologies, and public policies *simultaneously oriented* toward health, sustainability, and resilience.

Conclusions

(1) The integrated **concept of Bioharmonized Eating and Foods** proposes a paradigm shift: food is no longer merely a source of energy and nutrients, but a vector of bioinformation and an active factor in the process of biohomeorhesis—a process that enables the coherent integration of the ontological triad of Information–Energy–Substance (I&E&S) with the biodiversity and functionality of food systems.

(2) The new perspective on the **act of eating** can be viewed as a process of transforming and integrating information, energy, and nutritional matter within the organism; ***biohomeorhesis*** is proposed as the dynamic, evolutionary process underlying this coherent and adaptive restructuring of nutrition and the associated foods, such that bioharmonization becomes the integrating criterion for the biodevelopment of the food system toward systemic bioharmony.

(3) The multilevel quality assessment is supported by a series of specific indicators regarding nutrition and bioharmonized foods, namely: the Food Bioinformation Index (FBiI), Bioinformational Density of Food (BiDF), Food Biohomeorhesis Index (FBhI), and Bioharmonized Food Quality (BFQ)—a meta-indicator of the new framework that integrates energy-nutritional, bioinformational, and biohomeorhetic dimensions into a multilevel assessment.

(4) The **Multilevel Bioharmonized Assessment Methodology (MBhA)** regarding food quality—based on an integrated approach and complex quantification—demonstrates how the *bioharmonization process* and its *associated price* are complementarily configured, as well as the strategy for

transitioning from the market price to the bioharmonized price, the latter reflects the given food's contribution to the dynamic, evolutionary equilibrium of the complex "food–organism–eating & nutrition" system.

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