THE GLOBAL FOOD SYSTEM

A Latin American perspective

Martín Piñeiro

Cassio Luiselli

Álvaro Ramos

Eduardo Trigo

With the collaboration of

Sabine Papendieck and Mario Trucco

teseo

CARI / CONSEJO ARGENTINO PARA LAS RELACIONES INTERNACIONALES

GPS
GRUPO DE PAÍSES PRODUCTORES DEL SUR
GROUP OF PRODUCING COUNTRIES FROM THE SOUTHERN CONE

This Book is a translation of a previously published version in Spanish: Piñeiro, M; Cassio Luiselli, Alvaro Ramos y Eduardo Trigo. El Sistema Alimentario Global: Una perspectiva desde América Latina. Editorial Teseo. Buenos Aires, Septiembre, 2021. ISBN 978-987-723-302-5

The Translation was prepared by a team lead by Cynthia Jenkins to which the authors express their appreciation

This English version incorporates a few adjustments that reflect events that took place during the time passed between the publication in Spanish and the translation process and includes a few corrections of factual errors

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PROLOGUE

2021 has been the year, in which the Global Food System acquired an entity of its own, and is now recognized not only in technical spheres, but also in civil society and in the actions taken by governments. The United Nations convened an international conference to analyze, evaluate and propose new directions for the development of the global food system, including new options for its governance. This will result in higher visibility regarding the importance of national food systems that are part of it and, very probably, in international agreements or conventions that will affect its performance in the near future.

Why was this conference convened? What are the concerns that moved the United Nations to convene the governments of the world and civil society, in their multiple guises, to hold talks on a subject that was until now, in a certain manner, concealed behind agriculture?

On the one hand, the evidence that the global food system has become an intricate and complex set of economic and productive activities, both agricultural and non-agricultural, through which food for the world is produced. This food system involves, in addition to agriculture, transport and logistics activities, industrial processes, distribution and sales activities, including restaurants and direct sales of processed food. It also involves domestic and international financial mechanisms of different kinds and sizes, as well as the dynamics and behavior of investment flows: A wide range of activities on which approximately 40% of world population relies economically for its subsistence.

On the other hand, the interrelationships among food production and other important aspects such as environmental sustainability, human health and the welfare of significant sectors of society have become evident. This is an issue that several voices of civil society and of the scientific community have already been pointing to. These inter-relationships and the existence of trade-offs among them require that they be considered and assessed jointly.

These new perceptions and views have also made it clear that there is no global institutional system through which countries could consider, assess and agree both on domestic policies and on the collective actions necessary at the global level to guide the development of the global food system in an appropriate direction.

This book seeks to be a contribution to the dialogue that is just beginning. It aims to contribute to the understanding of domestic food systems and how they integrate in a world food system, as well as of the set of policies, instruments, regulations and economic incentives required to achieve a balanced and efficient global food system: a food system that ensures adequate food security for all inhabitants of the planet in a sustainable manner, both environmentally and from the standpoint of human health and social and economic sustainability.

This book presents a view from Latin America. In other words, it analyzes the food system from the actual circumstances of the region, describes the ways in which it operates and projects aspirations and needs from a regional perspective. It is the result of a collaborative effort of four friends who have shared many academic and institutional adventures throughout their life. No doubt this will not be the last!!!

The authors would like to thank Sabine Papendieck, author of two specific sections, for her very special collaboration, and Mario Trucco for his technical support in the preparation of the book.

Special thanks go to the Argentine Council for International Relations (CARI), to the Group of Producing Countries of the Southern Cone (GPS) and to the Universidad Autónoma de México (UNAM), institutions with which the authors are related. However, the opinions and proposals are the responsibility of the authors and do not necessarily reflect those of the aforementioned institutions.

Finally, special thanks to Karina Romero and Marcelo Iglesias for their cooperation in the preparation and editing of the manuscript.

INTRODUCTION

For centuries, food and agriculture were virtually synonymous. Most of the world population lived in rural areas and its main occupation was the gathering and production of food for its own consumption, without participation of the market. With growing specialization, the domestication of vegetable and animal species, the development of farming instruments and the growing settlement of the population in rural areas, excess food began to be produced, which created the need to preserve, process and sell it. First came bartering, but later money appeared on the scene and the goods began to be sold and purchased. Later, with growing urbanization, population gradually increased in ever larger cities, increasingly far away from the rural territories where the food was produced. This population began to depend for food on those who remained in rural areas and whose main activity was agriculture.

This process began to establish a difference between producers and consumers, and thus, to differentiate between agriculture and the provision of food for urban population. This geographical and functional difference also created logistical and transport needs and made the food market a powerful economic instrument. The logic of the markets themselves, both physical and economic, gradually changed and became more complex by acquiring new functions.

Later, technology, especially that relating to food processing, gradually introduced a growing differentiation between primary production, i.e., the products from agriculture, and the food that is actually consumed, which have very different qualities from those of their original components (raw materials). New products

emerged with an increasing degree of differentiation, resulting from the conditioning, processing, fractionation, packaging, handling and transport of primary commodities.

These two interrelated processes, urbanization and technology, mutually strengthened each other, and their effect on changes in cultural patterns and consumption habits and created complex food systems with many production processes and economic players which, on the one hand, separated and distanced agricultural primary producers from end consumers but, on the other, ended by articulating them into complex regional and national food systems.

In turn, such national food systems began to be interwoven, through international trade, into a global food system that has become the main production complex worldwide. FAO estimates suggest that over 40% of the world population obtains its main livelihood from its activities as part of the food system, and that such system is responsible for almost 1,300 million jobs worldwide (see table 1).

Table 1. Jobs and livelihoods: Covid risks in food systems (in millions)

	Food systems		COVID-19			
	Jobs	Livelihoods	At-risk-jobs	% of food system jobs	At-risk livelihoods	% food system livelihoods
Primary production	716.77	2,023.80	152.35	21%	404.76	20%
Food processing	200.73	484.54	120.44	60%	290.72	60%
Food services	168.97	339.44	101.38	60%	203.66	60%
Distribution services	96.34	241.48	57.81	60%	144.89	60%
Transportation services	41.61	101.05	16.64	40%	40.42	40%
Machinery	6.51	13.18	1.72	26%	3.48	26%
Inputs	4.89	11.06	1.29	26%	2.92	26%
R&D	0.13	0.29	0.02	15%	0.03	10%
Total	1,280.93	3,214.84	451.64	35%	1,090.89	34%

Source: unpublished FAO/IFPRI estimates, based on ILO 2000 – Extrapolation scenario. Non-annualized. The jobs represent normal employment; livelihoods cover a wide range of self-employed, informal, migrant and seasonal workers.

These figures show the extraordinary importance of the global food system within the set of economic activities that are part of the global economy and the significant threat represented by the pandemic unleashed by COVID-19.

However, the development of this great worldwide food system has been inorganic, and countries have not developed joint global actions except for those relating to trade and to health issues. As a result, and in view of the rapid growth of world population and the expansion of food demand resulting therefrom, as well as from the increase in purchasing power of a significant percentage of world population, there is a growing pressure on the scarce agricultural natural resources available on the planet.

This pressure has exacerbated, during the last five decades, bringing about a gradual global warming, the deterioration of water and soil, the loss of biodiversity and the increase of worldwide transmissible diseases showing the potential negative impacts that the food system may have on the environment and human health. These potential negative effects call for a new international awareness of the problem and the development of international agreements to govern both consumption patterns and the production processes leading to food production.

This new understanding of the importance of promoting an efficient and balanced development of domestic food systems and also, of the global food system, is mobilizing humanity to take actions that will make it possible to address existing and future problems. An expression of such concerns was the convening by the United Nations of the Food Systems Summit in late 2021 and the set of related activities that this significant meeting has brought about.

This document seeks to be a contribution to this process of analysis and conceptual development of possible international agreements and on the technical and political actions that are necessary

A good portion of the international discussion on this issue is taking place following a systems approach framework. Such approach makes it possible to analyze and conceptualize the multiple interrelations existing among the various components of the food system, but conceals the existence of the market, with its rules and institutions, and makes economic analysis, including the impacts of public policies, difficult.

This book addresses the problem from a simpler and linear perspective, where institutional dimensions and the definition of public policies are the main elements of the analysis.

The book consists of five chapters, in addition to this introduction. Chapter I presents a characterization of the evolution and current state of the global food system. Such characterization includes both the identification of the economic processes, economic players and production chains that make it up, and the economic and social trends that determine its on-going evolution.

Chapter II presents the evolution of the most widespread diets in the world and argues that the decision on what to consume is an individual right that must be respected. On the basis of this conception, the chapter presents the main issues for discussion and analysis in connection with the adaptation of diets according to the biological needs of human beings, as well as with the needs that arise from the dual goals of preserving nature and improving consumer's health.

Chapter III has a normative perspective. It describes and assesses five dimensions/attributes that must be taken into account in the construction of an efficient and balanced food system. It also describes the key items of each attribute and the trade-offs that exist when seeking to optimize each one of them independently. The chapter also describes and proposes various alternatives for actions that may lead to appropriate and balanced situations in each of such dimensions.

Chapter IV focuses on a description of agriculture production in Latin America and its institutional framework. It begins by acknowledging the importance of agriculture in the region as a key component of the regional food system and an

extremely important element for its economic growth and its international trade. The Chapter reviews the existing institutional organization in the countries of the region, assesses the participation that such structures have in the operation of the domestic food systems and their development. Taking such analysis as a starting point, four alternative proposals are developed concerning possible institutional reforms aimed at improving the capacity of the public sector in Latin America in determining a harmonious development of their domestic food systems.

Finally, Chapter V describes the institutional mechanisms that currently participate in the governance of the global food system and their ability to have an impact. Three options are proposed on the basis of such analysis for the construction of a new institutional framework that could, at least potentially, improve the governance for an efficient and balanced development of the global food system.

CHAPTER I

THE GLOBAL FOOD SYSTEM: EVOLUTION AND ANALYSIS

1. INTRODUCTION: A FOOD SYSTEMS APPROACH

This first chapter seeks to highlight, define and specify the concept of "food system." It seeks to show how the evolution and transformation of agriculture itself make it necessary to have a broader and more comprehensive concept to describe the activities carried out around food production and consumption. In this concept, agriculture is not just one more sector or an isolated production activity. It is part of a complex and transversal system of related activities, markets and production of economic value. Analyzing this complex system requires a broader and more rigorous framework for analysis that is fully incorporated in the "food system" concept.

In this evolutionary process, over time, local food systems were the basis on which national food systems were built. Such local food systems belong or are anchored to a given territory. In the specific case of South America, a region that is still clearly in an urbanization stage, with important changes in what is commonly known as the "rural area", rural territories have renewed links with surrounding cities. This greater interconnection with the local economy and markets and the development of better ways and means of communication, and particularly of digital technologies, have caused transaction and transport costs to diminish and have helped blur the differences between what is "urban" and what is "rural", as a result

of which it is often difficult to distinguish one from the other[1]. It is for this reason that the analysis of food systems requires a territorial and multi-scalar view, to understand how they really operate.

2. FOOD SYSTEM EVOLUTION AND DYNAMICS

The concept of "food system" may be analyzed from a long-term historical perspective that has been evolving and becoming more complex in parallel with economic development. It is part of the broad process of producing, gathering, transforming, distributing and consuming food for the various human societies.

Evolutionary processes have generated very rich and diverse agricultural and food knowledge, which may be described as *systems*. But it was only after the Industrial Revolution that the market began extending and generalizing and, to a certain extent, homogenizing food systems. Agricultural innovations, especially starting in the second half of the 20th century with the so-called "green revolution", have achieved notable increases in production and in agricultural productivity, multiplying by various orders of magnitude the availability of food in the world. Throughout history, food systems used to be local or regional, but with the development of markets, they also acquired a national dimension and, only later, a worldwide one.

Despite a growing international economy, trade in agrifood was merely a fraction of the volume of global trade, but this changed rapidly in the 20th century and the volume of agrifood trade grew markedly, giving rise to an new and important

[1] We are not referring here to "periurban" spaces, a closely related phenomenon, but with eminently urban dynamics: from the cities outwards.

international dimension. A global food system thus emerged, dynamized by an increasingly integrated world economy, with lower transport and transaction costs.

Globalization and economic openness have fostered a harsh competition for international markets and more integrated global agrifood value chains have appeared beyond national borders.

2.1 From agriculture to the food system: structural changes in the development process

Almost everywhere in the world, agriculture has grown markedly in the last century. Despite several regional crises, and even several famines, it may be said that agrifood production, as a whole, has been able to meet the demand of a growing population, which grew fourfold in the last one hundred years, and which became urbanized at a rapid pace, diversifying and expanding its food demand. However, and despite this significant growth, the relative weight of agriculture as a percentage of the entire economy has been shrinking worldwide and also in the specific case of Latin America.

The notable structural changes entailed by the general economic development process resulted in the growth of agricultural productivity, no matter how significant, being insufficient to equal or exceed that of other more dynamic sectors of the economy such as the manufacturing industry and, very particularly, the services sector, which led to a reduction of its relative importance in total GDP.

The academic analysis of the role of agriculture in the economic development process has emphasized the role of the agricultural sector by transferring value and

resources that facilitate and contribute to the industrialization process and to general economic growth. These issues have been reviewed in depth by various authors, such as Chenery[2] and Kuznets[3]. More recently, Alain de Janvry and Elisabeth Sadoulet[4], citing such authors, as well as the World Bank in its already classic publication on contemporary agriculture the 2007 "World Development Report", put the matter in perspective: the share of agriculture in the GDP and of rural labor in the primary sector drop secularly as the economy grows and per capita income increases[5]. In the beginning, rural labor decreases in relative (percentage) terms, but later it also drops in absolute terms.

In this entire process, rural-urban migration is a practically universal key factor (Harris and Todaro, 1970[6]), and a key element to be taken into account in any agricultural and rural development strategy.

In addition, in countries that are structurally very heterogeneous, as is the case with most of Latin America, agriculture makes other significant contributions to development. As pointed out in the pioneering and classic work of Johnston and Mellor[7], agriculture contributes to development through five strategic tasks[8], which are still in effect except in very advanced regions that are already completely industrialized and urban. Nevertheless, they were essential to understand how

[2] Chenery, Hollis B. (1979), *Structural change and development policy*, World Bank and Oxford University Press, Oxford.
[3] Kuznets, Simon (1966), *Modern Economic Growth, Rate, Structure and Spread.* Yale University Press, New Haven and London.
[4] Alain de Janvry and Elisabeth Sadoulet (2015)
[5] World Development Report (2007), pp. 27-39
[6] Harris, John R. and Todaro, Michael P. (1970). "Migration, Unemployment and Development: a Two-Sector Analysis". *The American Economic review,* vol. 51, Nº1. In bit.ly/3i4zJid.
[7] Johnston, Bruce F. and Mellor, John W. (1961) "The Role of Agriculture in Economic Development". *The American Economic review,* vol. 51, nº4. In bit.ly/3xHWFdM.
[8] Providing the economy as a whole with surplus work, capital, food, foreign exchange and a domestic market for the industrial sector, a leader in the process of structural change towards development.

agriculture fits into a world that was starting its development and industrialization process[9] around 1940 in the last century.

Empirical observation and the analysis developed in the literature concerning the historical decline in the contributions of agriculture to GDP have had a negative impact on the collective vision of its strategic importance in development. This has resulted in the secondary role assigned to agricultur in the design of development and public policies.

However, in more recent times, as agricultural productivity increased and the growing complexity of production processes had positive repercussions on the general economic growth process, multiplier effects and forward or backward (production) linkages in the agrifood chain also increased. This fuller and more sophisticated view was introduced on the basis of the pioneering work of Albert O. Hirschman[10]. In a way, Hirschman's works were the first steps towards the conception of the current food systems.

The key point that must be stressed is that this growing complexity of production processes resulted in a smaller decline in the share of agriculture in GDP, and much less significant if agro industrial and commercial food transformation activities are included and forward and backward linkages are taken fully into account.

The first quantitative estimates of this phenomenon were made by the Interamerican Institute for Cooperation in Agriculture (IICA) under the definition of

[9] Eicher, Carl K. and Staatz, John M. (1998). *International Agricultural development*, Johns Hopkins University Press, Baltimore.
[10] Hirschman, Albert O. (1958). *The strategy of economic development.* Yale University Press, New Haven.

"expanded agriculture". Table 1.2 presents the estimates made by IICA almost 20 years ago.

Table 1.2 Gross domestic product and agricultural value added in US$ billion and percentage, for 1997

	GDP (1)	GDP A (2)	GDP A/ GDP	GDP – Expanded agriculture	GDP – Expanded agriculture/GDP	Ratio between expanded agric. GDP and GDP A (6=4/2)
Argentina	326	14.9	4.60%	104.9	32.20%	7
Brazil	789.7	34	4.30%	206.9	26.20%	6.1
Canada	631.1	11.5	1.80%	96.5	15.30	8.4
Chile	76.1	4.3	5.60%	24.4	32.10%	5.7
Colombia	94.6	7.6	8.00%	30.4	32.10%	4
Mexico	388.8	17.9	4.60%	95.2	24.50%	5.3
Peru	64.9	4.3	6.60%	20.6	31.80%	4.8
Uruguay	19.1	1.2	6.20%	6.6	34.80%	5.6
United States	7,945.2	55.4	0.70%	644.9	8.10%	11.6
Venezuela	83.7	3.4	4.00%	17.2	20.50%	5.1
Costa Rica	22	2.5	11.30%	7.2	32.50%	2.9

Source: Trejos, Rafael *et al.* (2004*). Más que alimentos en la mesa: la real contribución de la agricultura a la economía.* IICA, Costa Rica.

As may be seen, in the case of the US and Canada and, in part, Mexico the more industrialized countries in the hemisphere, expanded agriculture makes significant but lesser contributions than those seen in the rest of the countries. In the latter, except for Brazil, where contribution stands at 26%, the contribution of expanded agriculture to GDP is more than 30% of GDP, i.e., one third of total GDP.

More recent estimates made in Mexico in 2014, but with a different methodology, suggest similar results. In the aggregate, the agricultural (and fishing) sector merely contributes 3.5% of GDP[11]. However if agro industrial and storage and distribution activities are also included, such contribution stands at 4.8%, which means that, in the aggregate, it represents 8.3%. The food and beverages industries account for no less than 21% of the national industry, which gives a clear idea of the weight of the agrifood sector.

Both table 1.2 and the more recent data on Mexico clearly show that, while agriculture drops as a percentage of GDP, the same is not the case if the food system is taken as a whole. This wider perspective suggests that the national food systems continue to be one of the main sources of employment and value generation.

These truly systemic production linkages, in the agricultural stages, have been a significant source of growth and value aggregation in the economies of the region. However, it is worth noting that, despite the foregoing, there is still a wide space and a great need for productivity increases in primary production, since that is where the population is less served by governmental social services, particularly in education and health. It is in the rural environment that the largest number of persons in a situation of poverty is found.

Furthermore, the analysis of this more complex agriculture, closely linked to other sectors of the economy must include other challenges of the agricultural sector relating to the environment and the preservation of natural resources. Among others, climate change, water which is ever more scarce and costly, biodiversity

[11] Instituto Nacional de Estadística y Geografía (INEGI) (2014). *El sector alimentario en México. 2014. México.*

soils degradation and the current rapid rate and deforestation are some of the most relevant[12].

Seen from a different angle, the rural environment can significantly contribute towards addressing the new environmental challenges described above. These issues, which are discussed in greater depth below, explain why the rural sector is currently considered as the provider of "environmental services", thereby adding a new dimension to the agricultural sector and rural territories. The development of a complete food systems vision and the required public policies must also take these new dimensions into account.

3. FOOD SYSTEMS: A THEORETICAL-METHODOLOGICAL APPROACH

The view of the agrifood sector as a food system, which is transversal and with multiple interrelations, allows for a more precise vision of the current problems of agriculture, the territories and biomes where it is deployed, and the ways in which economic value is created through complex production chains of agrifood supply. It makes possible the identification of an economic development route, where the food system has the challenge of developing more sustainably, both environmentally and in an economic and social sense, aimed at producing healthier and more nutritious diets.

3.1. Food system: a definition

Various definitions have been proposed for the concept of "food system". FAO has proposed the following one:

[12] In Latin America, approximately 40% of soils are suffering a significant degree of erosion and degradation.

> Food systems encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products. Food systems comprise all food products that originate from crop and livestock production, forestry, fisheries and aquaculture, as well as the broader economic, societal and natural environments in which these diverse production systems are embedded.

For its part, the Scientific Committee of the United Nations Conference on Food System has proposed the following definition: "The food system includes the production, transport, the agroindustry that processes and produces, food marketing activities and consumption of food, as well as the impacts on the environment, health and society."

It may be seen that both definitions include all actors involved in the food production chain and their interactions, the consumers and the economic, social and environmental context in which they develop, but they do it in a static manner[13]. For that reason, the following alternative definition is proposed:

> The food system is the *aggregate* of all the activities relating to food and the *environment* in which they take place: political, socio-economic and natural-territorial. The food system has many feedback loops. Generally speaking, it begins with a combination of productive resources such as land (soil), water, capital and work, to which are added the activities of transformation, storage and distribution to constitute the "supply". The system is completed with the

[13] Both definitions were taken from UNFSS, Scientific Committee Concept Note (2020). The Spanish translation was provided by the authors.

activities or actions of consumption and nutrition, which constitute the "demand"[14].

In other words, the characterization of the food system must take into account the biophysical-environmental, institutional and economic environment in which it operates"[15] and consider the issues of poverty and health, as they relate to the activities to satisfy food security.

It is important to point out that food systems may be defined in different territorial scales (subnational, national and global) and that, by definition, they are not closed systems or watertight compartments. In fact, they are continuously interrelated through the market.

The systemic approach implies working under the methodological framework applied to the "system" in connection with the entire agrifood process as a whole and analyzes the organization and the relations of interdependence within such complex entity[16]. The systems describe the interrelations existing between a group of socioeconomic actors and other physical and qualitative elements that constitute them, their causal links, their interactions and their dynamics, be they production units, government institutions, technologies, markets, the quality of food products, zoonotic diseases, roads and infrastructure and end consumers. Such items interact among themselves in many different ways. In the case of *open systems*, interactions also refer to the external environments through inputs that are incorporated or enter the system from outside, or *products (outputs)* that are poured outside of it.

[14] An issue open to discussion is whether or not consumption and nutrition are part of the food system. Here they are included as a core element of the system.

[15] Luiselli Fernández, Cassio (2020). *El IICA ante los desafíos de la coyuntura y la transformación a largo plazo: de la política agrícola a la política agroalimentaria.* IICA, San José, C.R.

[16] Capra, Fritjof y Luisi, Pier Luigi (2016). *The systems View of Life: A Unifying Vision.* Cambridge University Press, Cambridge, United Kingdom.

According to Pinstrup-Andersen, the systems approach is useful to address complex problems involving causalities and multiple results derived from their interactions within the system. The systems approach consideres a given entity or system in its entirety, with its inputs, dynamic interactions, products and feedbacks.[17]

A recent paper states[18]:

> It must be made clear, however, that the concept of food system does not replace that of agriculture, but rather, it assumes it comprehensively. Agriculture continues to be a fundamental activity, although it has been losing weight in the formation of value by comparison with agro industrial transformations of processing and distribution in the markets. The concept of food system stresses the interrelationships or linkages in "value chains" or supply chains, which go from cultivation to consumption, going through different phases or stages of transformation and aggregation of value. In this respect, it is very useful. The food system may also be analyzed from the point of view of the market and price formation: production and transformation activities, and demand activities, relating to distribution and consumption. It is thus extremely useful for descriptive and analytical purposes. Among other things, it is useful to understand the issues related to food and nutritional security.

3.2. The food system: its main components and economic and social actors

[17] Ericksen, Polly (2007). "Conceptualizing food systems for global environmental change research". *Global Environmental Change,* cited in Pinstrup-Andersen and Watson, *Food Policy for Developing Countries. The Role of Government in Global, National and Local Food Systems. Cornell University Press,* Ithaca, NY., p.5

[18] Luiselli Fernández, Cassio (2020). *El IICA ante los desafíos de la coyuntura y la transformación a largo plazo: de la política agrícola a la política agroalimentaria.* San José, C.R.

Food systems analysis entails, as a key assumption, studying the whole as a complex system and considering its multiple linkages in a nonlinear manner. The basic elements of a food system are the following:

1. natural resources and inputs;
2. primary production;
3. storage, transport and various exchanges of primary commodities;
4. secondary transformation or agro industrial processing;
5. storage, transport and distribution of processed goods; and
6. consumption, including nutrition and human health attributes.19

Therefore, the design of public policies for this multiplicity of actors and their many interrelationships make it necessary to move from agricultural policy to agrifood or food system policy.[20] This issue, with particular reference to Latin America, will be discussed in chapter IV.

These items or main actors constitute the core of a food system and interrelate mainly within the so-called "value chains". Within them, market structures and the possible restrictions to consumers access to food, whether for economic reasons or due to deficiencies of distribution, must be considered. These, in turn, receive the influence of various drivers that will be discussed below. Several economic agents or actors participate in the value chains which may be very simple, with few links, i.e. "short chains", "long chains" that are extremely complex, or "very long" chains, generally associated with global markets.

Despite their differing scales and areas of operation, all food systems have similar socioeconomic participants and components, whether agricultural or otherwise.

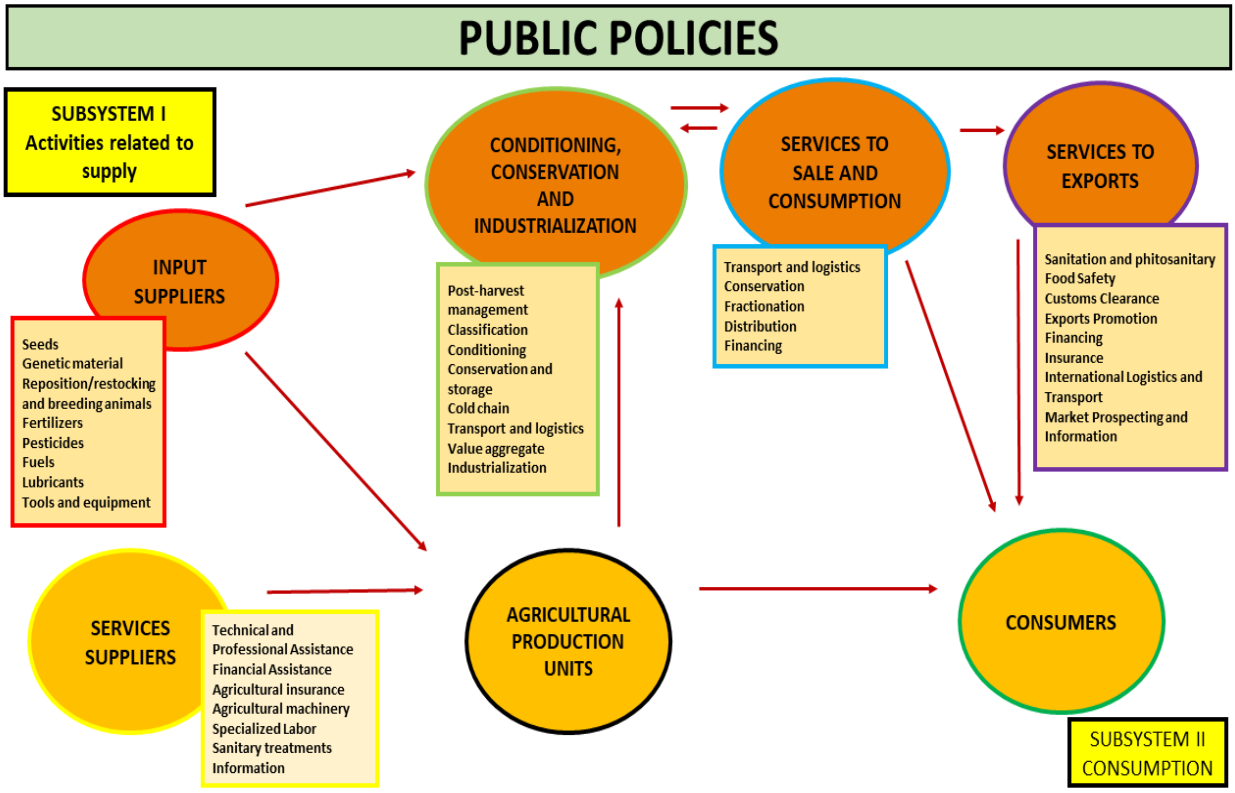
[19] Some authors also include waste at the end of the systemic cycle.

[20] Luiselli Fernández, Cassio (2020). *El IICA ante los desafíos de la coyuntura y la transformación a largo plazo: de la política agrícola a la política agroalimentaria. San José, C.R.*

Furthermore, food systems at various levels of aggregation, local, domestic and global, are very often interlinked among themselves through market mechanisms with various degrees of complexity.

Figure 1.1 shows, schematically, the various components that make up a food system. On the one hand, there are the main socioeconomic actors (the ovals) and, on the other, the main economic activities or functions that are carried out inside the system (the rectangles). The arrows provide an idea of the direction of the flow.

Figure 1.1. Food system scheme



Source: The Authors

The Figure also shows that a food system consists of two subsystems. The first is composed by the set of processes and economic functions that contribute to food production and supply, while the second is made up by the consumption/demand functions for food, i.e., by the consumers.

1) Small farmers and rural entrepreneurs

This is a very important group of actors and the basis of most local food systems. They are in charge of the production or gathering of food of very varied types. While there are many medium and large-sized agricultural companies with technological capabilities, small farmers or rural producers predominate from a numerical

standpoint.[21] It is estimated that there are over four hundred million small producers worldwide which are, as Alain de Janvry points out, "one of the most important social categories in the world"[22] because of their number and function. The huge majority of farmers or rural producers are very small-scale, and more than half of them are in China and India. In Latin America, calculations indicate that there are some 14 million smallholder units: approximately 60% are subsistence farmers[23], 12% are commercial and their production is market-oriented[24], and the balance, 28%, are the so-called "transition" production units, which fluctuate between the market and self-subsistence. De Janvry points out that even in Atlantic South America, where there are usually larger production units, 54% of the units are of less than 10 ha[25]. The other 46%, comprising almost one and a half million units, are more modern, capitalized and larger and aimed at the market.

2) Inputs Providers along the various value-chain links

These are enterprises of all kinds and sizes that supply primary producers with critical inputs to enable production. These inputs are mainly seeds, fertilizers and agrochemicals, as well as machines and equipment for various purposes, including irrigation. Very often, these companies provide credit to producers.

Seeds are the most critical and important inputs. Very often, they are produced by the producers themselves on site, but increasingly by specialized companies, particularly in connection with larger production units. It is a very heterogeneous

[21] Also known as "of small agriculture," "family agriculture," "smallholders" or simply "farmer" producers.
[22] De Janvry, Alain and Sadoulet, Elisabeth (2016), *Development Economics.* Routledge, NYC, N.Y.
[23] Also known as "self-consumption".
[24] Berdegué, Julio A. y Fuentealba, Ricardo (2014). The state of smallholders in agriculture in Latin America", in Peter Hazell and Atiqur Rahman, *New Direction for Smallholder Agriculture*. Oxford University Press, Oxford, United Kingdom (pp. 120-122).
[25] De Janvry, Alain and Sadoulet, Elisabeth (2016), *Development Economics,* Routledge, NYC, N.Y. (p. 777).

industry where participants include from small producer associations, the government itself, to large transnational firms. They produce and sell different types of seeds including indigenous, improved, hybrid seeds and, in some places, also transgenic seeds.

The fertilizer industry, particularly the producers of nitrogen fertilizers, is made up of more complex and larger industrial plants. It serves a growing number of producers who no longer use organic fertilizers as the main fertilizer. In addition, there is a wide range of industrially produced agrochemicals. Demand for bio fertilizers and natural nitrogen fixatives is growing, but this is still a budding, sector which is very far from meeting the fertilization and pest management needs of agriculture as a whole. In subsequent stages of the value chain, such as the harvest and post-harvest, there is a demand for sacks, plastic silos, large storage silos and packaging and other types of products for transformation, storage and transport.

3) Agroindustry and transformation processes

A large proportion of vegetables and fruits and some grains may be consumed directly but a large proportion of all food, including those that are derived from fishing and aquaculture, undergo transformation processes of very varied types. These agro industries, which are usually complex, represent a very important stage in the formation of value in production chains. They usually operate in cities, within the “urban-rural systems” described earlier. Within the food system, these are the most varied items and often require other inputs and external support services of the most varied type. They generally participate in the credit system and usually provide finance to agricultural producers.

4) Storage and distribution in various links or stages of the food systems value chain

Storage needs in food systems are huge. Seeds, fertilizers, grain and all kinds of supplies need to be stored and kept in the various value chain links. In addition to the storage networks, many products require cold and freezer networks, which add much value but are very complex and costly. Storage and cold networks are supplemented by transport services.

The distribution of fresh, processed or transformed food is another very important network in current food systems. It is the end point before reaching consumers, the last link in a food chain. In general, smaller and simpler production units are less separate from the consumption process. But as their market share increases, production units grow and diversify and the need for specific units or additional companies dedicated to distribution are needed. Fresh, processed and packaged food is usually sold in stores of all kinds, commonly small or medium-size neighborhood stores[26].

The so-called "supermarkets" deserve particular attention. This is the most dynamic sector of the food distribution link that has gradually displaced small and medium-sized food stores[27]. They are eminently urban, but ever more important in small and medium-sized cities. Their demands exercise great influence all along the supply chains[28]. They stock up from various sources located far away and, in the case of

[26] These are the heirs of the old "*pulperías*" throughout Latin America.
[27] An interesting variant of these supermarkets are the modern "convenience stores" that have sprung up in small cities, creating ruinous competition with small neighborhood stores.
[28] Luiselli Fernández, Cassio (2017). *Agricultura y alimentación en México: Evolución, desempeño y perspectivas.* Siglo XXI Editores, México (pp. 354-359).

small cities, usually displace or “strangle” local supply chains or short chains, indirectly affecting local agricultural production units.

5) Sale of prepared food for direct consumption

The direct sale of food already prepared for direct consumption by end users is a different activity that becomes increasingly important as countries urbanize. The companies selling such food are very varied. They range from the sale of food in small informal or ambulatory establishments, on the streets of cities or in popular stores or premises known by different names in the different countries[29] to the very diverse and extensive restaurant networks of all kinds in the cities. Health issues in this stage of the food chain are usually blurred and are overseen by health ministries.

These five food system components generate large amounts of rubbish and waste. Various studies, especially those carried out by the FAO[30], note that within the food value chain, waste and losses of raw materials and food may reach up to 30%. This is a serious problem, common to all domestic food systems.

6) Consumers

Finally, at the end of the chains are the sovereign consumers who, on the basis of their food preferences, establish a specific demand in the market. Through such demand, they exercise great influence on the food system as a whole. In other words, food systems are demand driven, and the entire production ends up by adjusting to such demand which is expressed through the market.

[29] Fondas, cocinas, ollas, boliches, tabernas, etc.
[30] https://bit.ly/3xqmzm0.

3.3 Food system operation: the role of markets

Both in the aggregate and inside the main "links" of a food system[31] -production-transformation-distribution-consumption- various markets are formed, generally interconnected, through which prices are determined. In addition, the food system may be conceptualized in terms of the two subsystems identified in Figure 1.1. On the one hand, "supply" (production, transformation, distribution) and, on the other, "demand" (consumption)[32], which are intertwined through the food market, in which prices are formed. This allows the analysis and modelling of the food system, both in the various production processes and at the end point of the formation of the price of food, without losing a "systemic" vision[33]. On the other hand, food systems, above and beyond the market, also operate within a complex economic and social framework, the description and analysis of which is beyond the scope and purpose of this text.

Furthermore, local or subnational food systems must be analyzed within the context of a new rurality, less isolated but differentiated from the urban environment. It is precisely inside of a local food system, where "urban-rural" interactions and links occur, not only directly, but also inducing related activities in local or short value chains.

The design of public agrifood policies requires the use of the "food system" concept to properly understand the complex system of economic actors and the technical and economic interrelations that exist among them[34]. Essentially, because it

[31] Also "value chains" or "supply chains".
[32] In some cases, "distribution" may be said to be part of demand, the retail sale of food at small shops, etc.
[33] The analysis of "general balance" in economic theory should be kept in mind.
[34] See Luiselli Fernández, Cassio (2017). "Segunda parte. El sistema alimentario mexicano". In *Agricultura y alimentación en México: Evolución, desempeño y perspectivas.* Siglo XXI Editores, México (pp. 148-189).

captures better than other analytical approaches the complexity, horizontality and interrelations around agriculture and food[35] in their varied dimensions. It also allows for a better understanding of feedbacks and multiple causality in value chains and price formation, in the various markets in which it participates[36]. It goes from agricultural policy to agrifood policy using a broader and fuller analytical model for policy formulation[37].

3.4 Dynamic factors that promote transformations of the food systems[38]

To understand the dynamics of the development of food systems, it is necessary to know which are the drivers promoting and molding them. Such drivers are phenomena or processes which, in one way or another, intentionally or otherwise, have an influence on the evolution and operation of food systems. Such dynamic factors introduce true structural changes in the forms of producing, processing or consuming food, including changes in diets and culinary cultures. These changes will have an impact on human food security and nutrition.

Recent literature identifies many types of such "drivers" or dynamic factors[39] that affect food systems. There are three basic types of drivers that relate to environmental concerns, considerations related to socioeconomic and cultural aspects and those related to the urbanization process. In this document, the main

[35] And even that of nutrition.
[36] Maxwell, Simon and Slater, Rachel (2004). "Food Policy Old and New". In Pinstrup-Andersen, Per and Watson. Derrill (2011). *Food Policy for Developing Countries. The Role of Government in Global, National and Local Food Systems.* Cornell University Press, Ithaca, N.Y. (pp. 30-33).
[37] Pinstrup-Andersen, Per and Watson, Derrill (2011). *Food Policy for Developing Countries. The Role of Government in Global, National and Local Food Systems.* Cornell University Press, Ithaca, N.Y.
[38] Known in the English literature as *drivers*
[39] See, for example, Benea, Christopher *et al* "Understanding food system drivers: a critical review of the literature". *Global Food Security Journal,* vol. 23, Nº4, pp.149-159. In bit.ly/3rbp1dL.

reference will be the six categories developed by Bendjebbar, Dury *et al*.[40], which are synthetic and comprehensive at the same time. Such authors describe six types of dynamic factors that are the main food system drivers:

1) The scope, characteristics and evolution of environmental and biophysical conditions, such as the relative natural resource endowment, like water and soil, the state of biodiversity, climate and its changes, as well as the various forms of pollution in the biosphere. Their effects on the food system have a particular impact on basic production processes and their efficacy and productivity.
2) Demographic factors as they refer to the producers involved in the production chains and to consumers of food and the changes in demand, both in quantitative terms and as regards changes in consumer preferences. In this connection, it is necessary to consider, on the one hand, the growth of the population itself, which will continue to be rapid and, on the other, **migrations and urbanization which are perhaps the factors with the greatest impact on demand and changes in diets and culinary "cultures".**
3) Innovation processes, technology and infrastructure, all of which are extremely important and have a great influence on food system dynamics, both in the production and transformation (supply) aspects and in those of demand, relating to their impact on transport systems, trade and food marketting.
4) Economic factors that have an influence both on demand and on supply. They include changes in per capita income, prices and markets, local and

[40] Dury, S., Bendjebbar, P. Hainzelin, E. Giordano, T. and Bricas, N. (eds) (2019). *Food systems at risk: new trends and challenges*. Rome, Montpellier, Brussels, FAOB, CIRAD and European Commission.

international trade, financial systems and, in general, globalization itself, seen as a broad economic and social phenomenon with multiple influences on contemporary economies and societies. Particularly worth noting is the fact that changes in per capita income have a great influence on the composition of diets, and their nutritional qualities. Generally speaking, when income increases, diets diversify and the ingestion of proteins increases, but the consumption of fats and sugars usually increases as well, resulting in the 'regressive paradox' of greater consumption as well as greater degradation of nutritional values.

5) There are the sociocultural drivers. These naturally include the diets and "cooking"[41] of each country and culture. In many countries, these culinary cultures or traditions have a strong historical and identity root. At present, some of these factors collide with others that refer to a progressive "westernization" of diet content and even of consumption practices, such as eating at home or in restaurants.
6) Political drivers. They refer to matters such as the legal and regulatory frameworks making up food system governance. Also considered are public policy design and their content, as well as the mechanism for monitoring and evaluating them. It is clear that these political factors refer both to demand and to supply factors.

3.5. Food system operation and scope

The ultimate goal of food policy is to achieve an adequate food security for all. In other words, according to the basic definition proposed by FAO, "for all people, at

[41] With the French meaning of *"cuisine"*.

all times, to have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life"[42]. This objective is stated and may be achieved through comprehensive policy actions concerning food systems. In other words, food security and nutrition comprehensively incorporated into the food systems themselves.

4. FOOD SYSTEMS: SCALES AND AREAS OF ACTION

Food systems operate at different scales and are all interconnected in various ways and mainly through the prices that apply in the different markets. There are three main scales: local, domestic (national) and global, and they all have similar structures and operating patterns.

4.1. The local scale

Local food systems have a new and important role within the framework of the so-called "new rurality", in which small agriculture, commonly known as "family farming" agriculture, has a permanent importance. The "new rurality" refers to two main phenomena. First, the previously clear differentiation between the strictly rural and the urban areas has gradually become blurred. Increasingly, rural and urban are mixed and interrelated. Most agricultural communities are very close to some city, whether small, medium-size or large. The "deep rurality" of small isolated communities very far from urban centers is shrinking. A second phenomenon of this "new rurality" is that most peasant families no longer derive their main income from strictly agricultural activities. Instead, such new rurality is made up of various activities, some of which are related to agricultural work, but also to other, clearly differentiated non-farm work. There is a growing "rural, non-

[42] FAO (1996) "Rome Declaration on World Food Security." Rome.

agricultural economy" (RNAE) often directly linked to the operation of food systems and the "short value chains" that make them up.

This "rural" environment is also part of a different demographic and migratory pattern owing to the intense global urbanization process.[43] Thus the rural or farming population decreases in relative terms and it will soon do the same in absolute terms, reflecting the deep structural changes that are taking place. The "new rurality" and the consideration of territories as "urban-rural" units or systems is a relatively recent approach that is being used for the analysis of agriculture as part of the broader and transversal framework of food systems.

This has consequences on the design of public policy. Up to now, the "sectorial" view has been the methodological perspective mostly used in the design of public policies and support programs for rural producers and their families. Furthermore, the subjects of such policies have been, generally speaking, groups of producers or families from a given region or settlement, without taking much consideration to their geographical or territorial environment, as well as the biomes where they are located. The territorial vision[44], on the other hand, sees all of them as a substantial part of the productive and consumption web that is considered to be the subject of public development policies.

This is important as it is becoming increasingly evident that in the "new rurality" there is a production link that includes a permanent and active mobility of persons and productive resource between the agricultural and livestock producing areas

[43] In Latin America, a continent with more than 80% of the population already settled in cities and where the urbanization process continues, albeit at a slower pace.

[44] Berdegué, Julio A. y Favareto, Arilson (2019). Desarrollo Territorial Rural en América Latina y el Caribe", FAO, Santiago de Chile, as well as various papers by Julio A. Berdegué and Alexander Schejtman, and research in that regard by the RIMISP Center, Latin American Center for Rural Development.

and the cities where they are located. This is no longer just the traditional concept of "hinterland", but rather of mutual economic activities which take place at the local or regional scale. Rural cities, generally small or medium-sized, are an important productive link of local economies and their respective regions. In this connection, a systemic analysis is extremely useful, as it makes it possible to understand more clearly the structure of local or proximity food chains, more commonly known as "short chains".

In those territories where this "new rurality" is taken place, family or smallholder agriculture[45] is an intrinsic part of local food systems and one of the most common forms of production. For that reason, it is important to strengthen small family production units which are, in Latin America, the largest and most important form of production in the region, with some 14 million units or productive plots and more than 60 million persons[46]. The so-called "small family agriculture" is often a source of supply and food security and a basic engine of local food systems.

Small cities play a strategic role in the urban/rural interface. They are the basis for the territorial integration or "embedding" of local and regional food systems, since they act as "nodes" of a spatial interaction network among various settlements and their areas of economic and social influence. They are responsible for articulating numerous economic functions between the rural (agricultural, forest etc.) and the urban environment[47] It is in this type of small cities where many non-agricultural

[45] One variant is the one known as "semi-family" where production units also use supplemental labor, whether paid or under contract, outside of the family itself.

[46] Berdegué, Julio A. and Ricardo Fuentealba (2014). "The state of smallholders in agriculture in Latin America." In Hazell, Peter and Rahman, Atiqur. *New Direction for Smallholder Agriculture.* Oxford University Press, Oxford, United Kingdom.

[47] FAO (2017). "The state of food and agriculture: leveraging food systems for inclusive rural transformation". Rome.

economic activities (NAEA) take place, often linked with the value chains that make up local food systems. In other words, they are the unavoidable area of proximity of any agrifood strategy at the local level.

In Latin America, the large majority of small cities have between 10 and 60 thousand inhabitants with an average size of about thirty thousand inhabitants.[48] They are usually precariously equipped in terms of infrastructure and roads, and their services are usually deficient and relatively costly (hydraulic sanitation, waste disposal, local transport, etc.). Often, formal trade derived from supply made through long chains discriminates or "strangles" weak local supply chains, which require specific support to prosper and become stronger.

The main limiting factors and deficiencies faced by small cities stem precisely from their small size, which makes the provision of appropriate infrastructure more expensive, as well as the fact that they have limited management-level human capital and weak governance. They often suffer from serious levels of poverty, informality and job insecurity. That is why investments are needed to enable essential activities within local development strategies in connection with the development of food systems: i.e. it is not only a question of promoting basic agricultural or livestock-breeding activities, but rather of the broad set of related activities related to the local food system

Small and some medium-sized cities become the core of a "territorialized" strategy to promote local or regional food systems. Basically, they need to be equipped, provided with better accessibility and connectivity to lower transport costs and,

[48] Aguilar, Adrián G., Graizbord, Boris and Sánchez Crispin, Álvaro (1996), *Las ciudades intermedias y el desarrollo regional en México*. El Colegio de México, México. And Rondinelli, Dennis A. (1983). "Towns and Small Cities in Developing Countries". *Geographical Review,* vol. 73, Nª4.

through capital investments and assets, establish and enable productive “clusters”, including short food chains.

5. THE NATIONAL OR DOMESTIC SCALE

This scale refers to the food system that exists within the borders of a given country. It is perhaps the most important dimension or scale from the standpoint of the design and implementation of public policies. This geographical dimension is regulated by national governments, which are the entities that have the broadest and most powerful policy instruments at their disposal

Domestic food systems have the same structures, economic actors and function in a similar way as those described in connection with the local or sub-national food systems. However, the domestic food system is not simply the aggregate of the local or subnational food systems. Its genesis and operation are the result of dynamic interrelations of the local systems taken as a whole. The specific characteristics of these interrelations result from the availability of resources, the rules of laws and the *modus operandi* of the domestic markets and the opportunities and circumstances of the external markets to which the country has access. It is important to take into account the characteristics, not only of the production chains related to the supply stages, but also those related to the diets and consumption peculiarities of each country. If at the local level the “short agrifood chains are especially important’’ within an entire country the “long chains” predominate.

At the national scale, it is possible to see the history and the culture of each country in the predominant diets and culinary knowledge or, more precisely, its national food system. However, it is also true that, as a consequence of globalization, there are very few relatively autarchic countries in agrifood terms, and diets are becoming

increasingly similar all over the world, at least in terms of their nutrient contents. For instance, consumption of processed foods is increasingly common, preference is given to protein consumption and fat and sugar consumption is growing. Practically all countries, in varying degrees, are increasingly open to the international agrifood market.

6. GLOBAL SCALE: THE GLOBAL FOOD SYSTEM

The so-called "global food system", made up of the broad set of national food systems,[49] has been growing rapidly. Its basic operating systems are similar to those already described for the previous scales, and the peculiarities added at the global level are expressed primarily through transnational investments and international food trade[50] -whether grain, meats, fruit, fresh and processed food- as well as in various inputs. It is organized through "long" value chains. More than 20% of food consumption worldwide originates in imports.

Regional or national supply shortfalls and surpluses are offset through this international trade and agrifood markets are stabilized through the price mechanism. In other words, it plays a key role in food security at the domestic and worldwide level.

Between 2000 and 2019, world agrifood trade tripled in terms of its value, growing at rates in excess of an annual average of 7%, more than one percentage point above trade in all goods. Thus, agrifood trade went from accounting for 6.7% of total trade in 2000 to 8.5% in 2019.[51]

[49] This includes regional or local subsystems at the domestic level.
[50] Sea and aquaculture products are included, as are various types of beverages.
[51] See UN Comtrade Database.

It should be borne in mind that the development of a fair global food system should take into account, in a balanced manner, the following five dimensions or attributes that will be discussed in detail in chapter III:

a) Be capable of expanding its production in an efficient and sustainable manner, to serve an ever greater and more exacting demand;

b) Be environmentally sustainable;

c) Observe quality and human health related standards;[52]

d) Meet international nutritional quality standards; and

e) Be socially and economically sustainable.

Possible ways and means for the construction of a better global governance mechanism able to guide the development of a balanced global food system is further discussed in chapter V.

7. FOOD SYSTEMS AND THE PARADIGM OF LONG-TERM SUSTAINABILITY

The fundamental function of food systems, in each of the three levels: local, domestic and global, is to adequately feed the population that depends on them. In this connection, the efficiency and production capacity of such systems, and thus, the quantity, quality and price of the food offered are the basic objectives sought.

However, more recently, the sustainability paradigm, both in practice and in development programs, poses a new challenge to the development of food systems. The concept of "sustainability" is universally accepted. Its definition is as elegant as it is apparently simple: sustainable development is "a development style

[52] To comply with the *Codex Alimentarius.*

that makes it possible to meet the needs of current generations without compromising the possibilities of the future generations to meet their own needs."

However, making sustainability operational and measurable over time has turned out to be an arduous and complex public policy exercise. On the one hand, understanding that it refers to inter-temporal preferences, i.e., that the variables that are considered a priority today may not be as relevant tomorrow or may have been replaced by others through ceaseless technological change or because of changes in consumer preferences. Furthermore, the sacrifice involved in postponing or containing a given consumption over time entails possible conflicts among various social groups or age brackets. This conception of "sustainability" is being incorporated into the vision of food system development especially in regards to two main dimensions: environmental and socio economic which have been incorporated in the analysis as two of the main dimensions/attributes described above

However, internationally the environmental sustainability is the most developed dimension. The Paris agreement and the periodical high level conferences (COPs) installed this dimension as the overriding preoccupation at the global level. The environmental sustainability dimension expresses itself in the global food system through the following three main linkages.

The first link refers to climate change which has been fully incorporated as a guiding principle in the concept of the "green economy", and also in the "circular economy" and more recently as part of the Green New Deal proposed by the European Union[53]. The latter is particularly interesting as it points to a renewed

[53] See in this regard the various UNCTAD (UNO) approaches and projects.

multilateral route for action and fully incorporates the purpose not only of environmental sustainability, the decarbonization of the economy and the fight against global warming including a greater effort towards global equity.

The second relates to the interaction between climate change and zoonosis. There is a critical link between the two which are two of the greatest challenges of the contemporary world. The advance of global warming, and its impacts on some elements of the food system, is already a clearly established fact and progresses in practically all regions:

> Global warming not only affects climates, but also alters the times and modes of germination of an infinite number of plants, while at the same time impacting some vital cycles of earth, such as those of water and nitrogen. All this, in turn, has multiple effects, one of which is that it disrupts the habitats of species and pathogens (viruses, bacteria, fungi) and hence also the marked zoonotic impact seen in the last few years[54].

The zoonotic impact refers to the illnesses that human's acquire in their interaction with animals. The diseases that pass from animals to humans are clearly increasing as the destruction of *pristine habitats* progresses. Their loss is clearly related to the serious and growing emergence of zoonotic diseases[55] and the rapid propagation of the COVID-19 virus, which is the first large-scale health crisis so far in the 21st century. Various illnesses also caused by viruses[56] are magnified owing to factors

[54] Luiselli Fernández, Cassio (2020). *El IICA ante los desafíos de la coyuntura y la transformación a largo plazo: de la política agrícola a la política agroalimentaria. IICA, San José, Costa Rica.*
[55] See bit.ly/2hjX40b.
[56] Such as ebola, avian flu, H1N1 flu, Zika and the Rift Valley fever.

that are characteristic of globalization such as trade and the international mobility of persons.

A third link is the growing loss of biodiversity. Biodiversity is the great reservoir of life on the planet, and its value is immeasurable. The natural surface of the planet, or the biomes where biodiversity as a whole is expressed, are essential to maintain the temperatures of the earth and are, with their forests and jungles, the largest carbon cesspool in the planet. It is important for food, for the medical industry and to produce dyes, resins, adhesives, fibers and many other products. Furthermore, biodiversity provides valuable environmental services, provides landscape and decisively supports the tourist industry.

In this regard, Latin America is the most biodiverse region of the planet[57], giving its territories great value[58]. Everywhere, and also in Latin America, biodiversity is being lost at a rapid pace, but Latin America is the region with the smallest loss, in percentage terms, of its original biodiversity capital.[59]

This biodiversity loss is a consequence of the pressures of climate change, soil erosion and the exploitation of natural resources by some food systems that operate unsustainably and without sufficient environmental regulation. A particularly important case is land use change through accelerated urbanization and the massive opening up of land for agriculture and livestock production. The negative impacts of land use changes, where forest land, jungle land or land with significant biodiversity is plowed, cannot be considered a strictly agronomic

[57] See bit.ly/3hInEie.

[58] Six of the countries with the greatest biodiversity are Latin American: Brazil, Colombia, Peru, Mexico, Venezuela and Ecuador. Central America as a whole also has great biodiversity. Furthermore, over 40% of the biodiversity of the world is in South America.

[59] Papendieck, S. (2021). "Requerimientos de 'deforestación cero' para productos agroindustriales en el acceso a mercado. Análisis de conformidad de las exportaciones del Mercosur". Grupo de Productores del Sur (GPS).

phenomenon. On the contrary, it has systemic effects which are potentially of great magnitude.

Accordingly, the development of food systems and agricultural growth in particular, must be based on increased productivity of the land suitable for such purpose and preferably already occupied, as well as on strengthening local value chains, and other non-agricultural activities[60]. In other words, there is very little margin left for expanding the so-called "agricultural border". A fuller territorial vision needs to be developed that includes the resilience of territories and of the local food systems.

The effect of these three closely interrelated processes intimately connected to food system development is extremely important for the development of civilization as we know it. This is a true crossroads of civilization, where it becomes clear that the prevailing production and consumption patterns, in some countries and regions, are clearly unsustainable and must transit towards more sustainable production systems.

For Latin America it is a difficult challenge. The region has a very high socioeconomic vulnerability with the greatest inequality among all the regions of the world and large layers of the population living in poverty and various degrees of social exclusion, located in informal settlements or in acute rural margination[61].

But the Region also has a very important role and responsibility in contributing, through its food exports, to global food security. The way forward must be based in the development of efficient and sustainable national food systems which, with the

[60] ERNA (rural non-agricultural economy).
[61] Luiselli Fernández, Cassio (2020). *El IICA ante los desafíos de la coyuntura y la transformación a largo plazo: de la política agrícola a la política agroalimentaria. IICA, San José, C.R.*

help of science and technology, integrate, in a balanced manner, all these dimensions relating to sustainability in the long term with the need to increase food production to feed the world.

CHAPTER II

FOOD CONSUMPTION PATTERNS: NECESSARY CHANGES AND THE ROLE OF THE PUBLIC SECTOR

1. INTRODUCTION: CONSUMPTION PATTERNS AND THE FOOD SYSTEM

Chapter I focused on describing and characterizing the evolution and the current structure of the world food system. Such characterization includes a clear differentiation between two subsystems: one representing the demand for food by consumers and the other made up both by the production and economic processes that make food supply possible and by the economic and socio-economic players who carry them out.

This chapter seeks to characterize and identify the main problems and challenges that are relevant to the subsystem made up by food demand and consumption.

Food consumption patterns have evolved throughout the history of humanity and very rapidly in the last 50 years, hand in hand with the globalization process. Current diets, which are the result of such world-scale transformation, are nowadays being questioned on the basis of some parameters that are not considered to be optimal in terms of the nutritional needs of consumers and, in the case of meat, also because of its potential environmental impact.[62]

[62] In addition, food consumption patterns are being criticized because of their impact on environmental sustainability and because of the huge losses by waste, particularly in more developed societies. This subject is discussed elsewhere in this book. See, for instance "Future food systems. Global panel on agriculture and food systems for nutrition". Foresight 2.0, September 2020.

As a result of this critical perspective, some recent literature has suggested that the current global food system is a total failure from the point of view of the provision of adequate food to world population. The argument is based on two main assertions: a) even today, there are a significant number of persons who are underfed, and b) current diets are linked to an increase in the occurrence of non-infectious pathologies associated with food, such as obesity, diabetes, hypertension and coronary diseases.

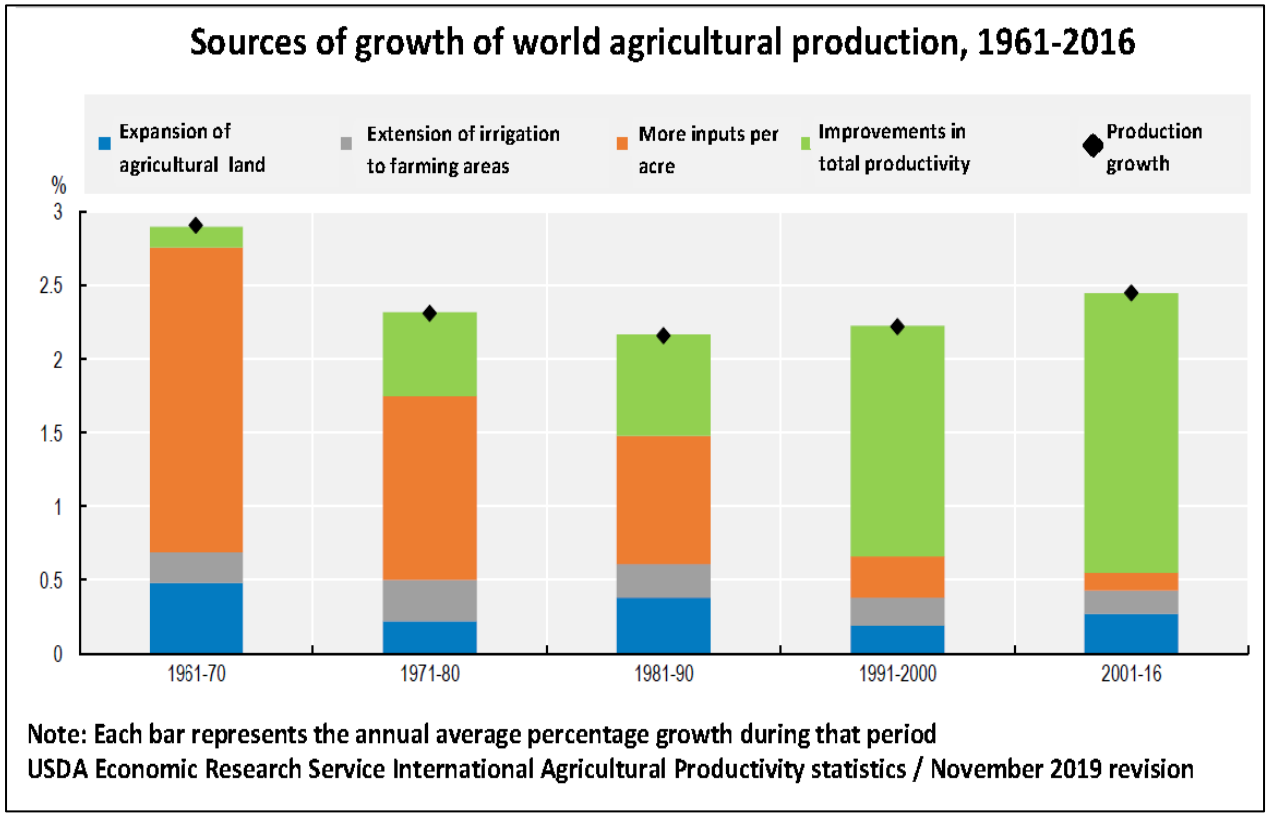
While it is true that in the current situation there are serious food insecurity problems and a growing occurrence of diet-linked health problems, the conclusion that the food system is a failure is, at the very least, an exaggeration. From a different and probably more balanced view, several arguments may be put forward.

As pointed out by the OECD, the food system was able to increase production to feed a rapidly growing world population, which went from approximately three billion persons in 1960 to more than seven billion eight hundred million in 2020. This marked increase in food production, of over two and a half times, was made possible by a huge productivity increase achieved in some crops and in some regions of the world mainly as a result of the technology generated in the so-called "green revolution" led by the Consultative Group for International Agricultural Research (CGIAR).[63]

This was achieved, particularly starting in the 90s, through a very significant increase in the productivity of factors of production rather than by an increase in the cultivated area.

[63] OECD (2021). *Making better policies for food systems.* Paris.

Figure 2.1

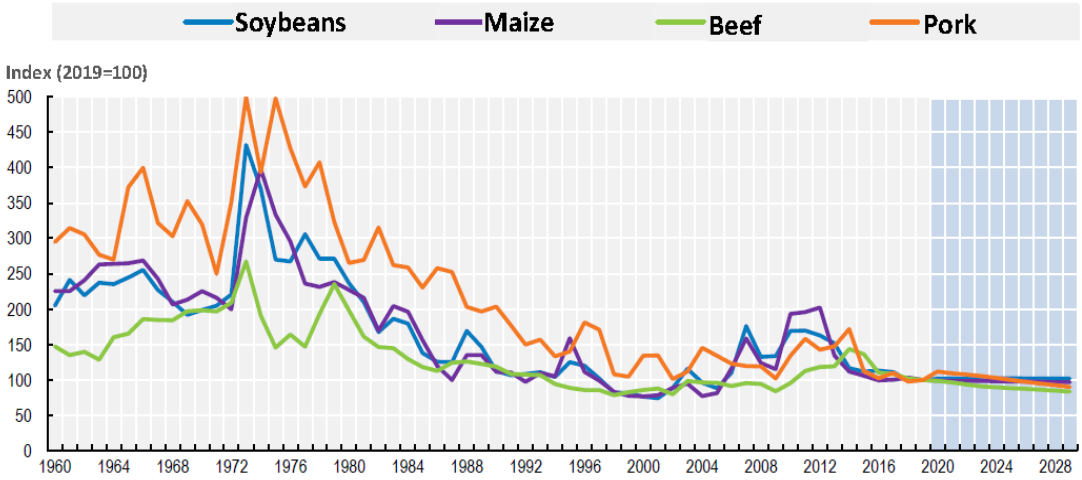


This increase in production and the resulting international trade allowed for a better use of the scarce natural resources at world level and, thus, a significant reduction in the price of food.

It is important to emphasize that, generally speaking, the situations of food insecurity that exist are mainly associated with lack of income and, thus, with the impossibility of gaining access to food that is available on the market. Hunger in the world is more a consequence of poverty than of the lack of food.

Figure 2.2

Long term evolution of real agricultural prices



Note: Historical data for soja, corn and beef from the "World Bank Commodity Price Data" (1960-1989). Historical data for pork from USDA Quick Stats (1960-1989).
Source: OECD/FAO (2020) "OECD.FAO Agricultural Perspective – OECD Agricultural statistics (database) http://dx.doi.org/10.1787/agr-outl-data-en

In recent years life expectancy has increased substantially. Between 1950 and 2020 it rose from an average of about 46 years to approximately 72 years. This represents an increment of 24-years in life expectancy over a period of only 70 years. These figures, which represent a world average, conceal large differences between countries. National averages range from a life expectancy of around 52 years for some poor and developing countries to a maximum of 90 years in Andorra, the country with the highest life expectancy. Most developed countries, where current diets include a significant proportion of products that are challenged nutritionally, such as animal products, sugar and flours included in products with a high degree of industrial processing, have a life expectancy that fluctuates between 75 and 83 years. While it is true that the notable advances achieved in connection with science and technology, medicine, the construction of drainage systems, waste

management, drinking water and other advances of civilization, explain a good part of such increase in average longevity, this could not have happened if food consumed was not reasonably appropriate for the biological needs of human beings.

These arguments do not mean that the current situation is good or the most desirable one. Obviously, it is not, and there are many areas in which it is important and necessary to make progress for the world population to adopt healthy diets that contribute to a healthier and longer life. A greater investment of monetary and political resources to prevent and educate on diet quality, as well as for the protection of the environment in all its dimensions, is an essential measure.

To be able to make progress in that direction, it is essential to understand consumption pattern trends and to identify the actual problems existing at present and those that may appear in the future through a balanced analysis based on scientific evidence. This may constitute the proper basis for making proposals and to define the policies and actions necessary to inform and guide the development of consumption patterns consistently with human health requirements.

2. FOOD DEMAND AS AN AUTONOMOUS PHENOMENON

In 1994, on the occasion of the World Conference on Food Security organized by the United Nations, in which FAO played a key role, member countries agreed that food security was a fundamental right of humanity and a key objective of global

development. In other words, countries undertook to work, both individually in their own countries and collectively at world level, to eradicate hunger in the world.

This historic commitment raised the issue of food security to the highest domestic and international policy level. This commitment was amply ratified and instrumentalized in 2015 with the approval of the 17 Sustainable Development Goals (SDG), which became the route map for development both at the domestic and at the global level.

A first point to be stressed in an analysis of food is to differentiate agriculture from food. In the modern world, most of food production is differentiated and physically far from the consumption of the same food. This results in that the diet consumed by most persons does not depend on what each consumer produces, but rather on what such consumer can obtain in the market.

Accordingly, the demand for food is an autonomous and subjective phenomenon that depends on the individual decisions of millions of consumers who choose how much and what to consume. The choice of such diet by each consumer is determined, as regards its qualitative features, by the subjective preferences of consumers, which are linked to cultural patterns and personal tastes.

Furthermore, actual demand, i.e. what consumers actually bye and consume (consumption) is the result of the interaction between what they would like to consume and the physical accessibility and the cost/price of the various foods available to them. These conditions, accessibility and price, are determined by the

features and operation of the food system, including public policies and the market. Accordingly, one of the main elements that determine the effectiveness of a food system is the physical accessibility and the market price of the various foods available to consumers and very particularly, to urban consumers.

3. GLOBALIZATION IN FOOD CONSUMPTION PATTERNS

In the beginning, food consumption patterns were determined by local availability of food. Primitive cultures with no trade, technology or scientific knowledge and very close to the rural environment ate what they could gather, hunt, grow rudimentarily or raise with local natural resources. These characteristics of the manners of obtaining food supply in the rural environment forged local food patterns which became key items of the habits and cultural characteristics of the population in the various regions of the world.

Globalization, slow in its early stages and extraordinarily rapid in the last 50 years, and, in particular, human migrations, tourism and information have diluted these local food patterns and have globalized consumption of certain foods that have rapidly become generally and deeply accepted. Spaghetti, bread, rice, potatoes, coffee and, in a certain way, animal products, are examples of food items whose consumption became substantively globalized and which have become staples in the diet in a large majority of countries and regions.

This phenomenon of standardization of the diet at the global level was made possible by international trade and by the price relationships which emerged between the various types of food, which provided greater access to them Furthermore, the standardization of the diet worldwide was accompanied by two additional components: an increase in the consumption of food with some level of

industrial processing and a high, and growing, proportion of consumption that takes place outside the home, a phenomenon that resulted from changes in family roles and in work opportunities

This globalization of consumption and the changes in its basic qualitative features are the results of many factors that changed not only food consumption patterns, but also the entire world food system, taking it to its current situation.

The most important factors in terms of their specific impact on changes in food consumption patterns have been those mentioned in chapter I: rural/urban migration, growing urbanization, the increase in income levels, particularly of urban inhabitants, tourism, technological developments in the agro-industrial processing sector and trade. All these factors have also had a determining role in the evolution of the food systems subsystem that includes all processes related to food supply.

In addition to these factors, from the point of view of changes in consumption patterns, it is particularly worth mentioning the entry of women into the labor market. A direct consequence of this phenomenon was the reduction of the disposable time, material possibilities and personal choices that limit the possibilities of women to carry out household activities, including the time devoted to the purchase and processing of food at home. This resulted in a trend to simplify home-made food and increase consumption of industrially processed food. The time and financial resources used to buy ready-made food and to eat out at restaurants have also increased exponentially, which resulted in a quicker homogenization of consumption patterns.

The final impact of this set of phenomena has been the incipient universalization of certain culinary cultures that have gradually become global food patterns for vast sectors of the world population. This trend will no doubt intensify over time and will strengthen global value chains, both of primary commodities and of processed foods, and will generate more food trade worldwide.

While the COVID-19 pandemic has put a stop to these globalization processes, it is to be expected that, once the pandemic is over, the same trends will reappear again.

4. THE NUTRITIONAL QUALITIES OF FOOD: some areas of disagrement

In recent years a new concern has emerged in connection both with the quality of food and its relationship with human health, and with the impact that food production has on the environment.

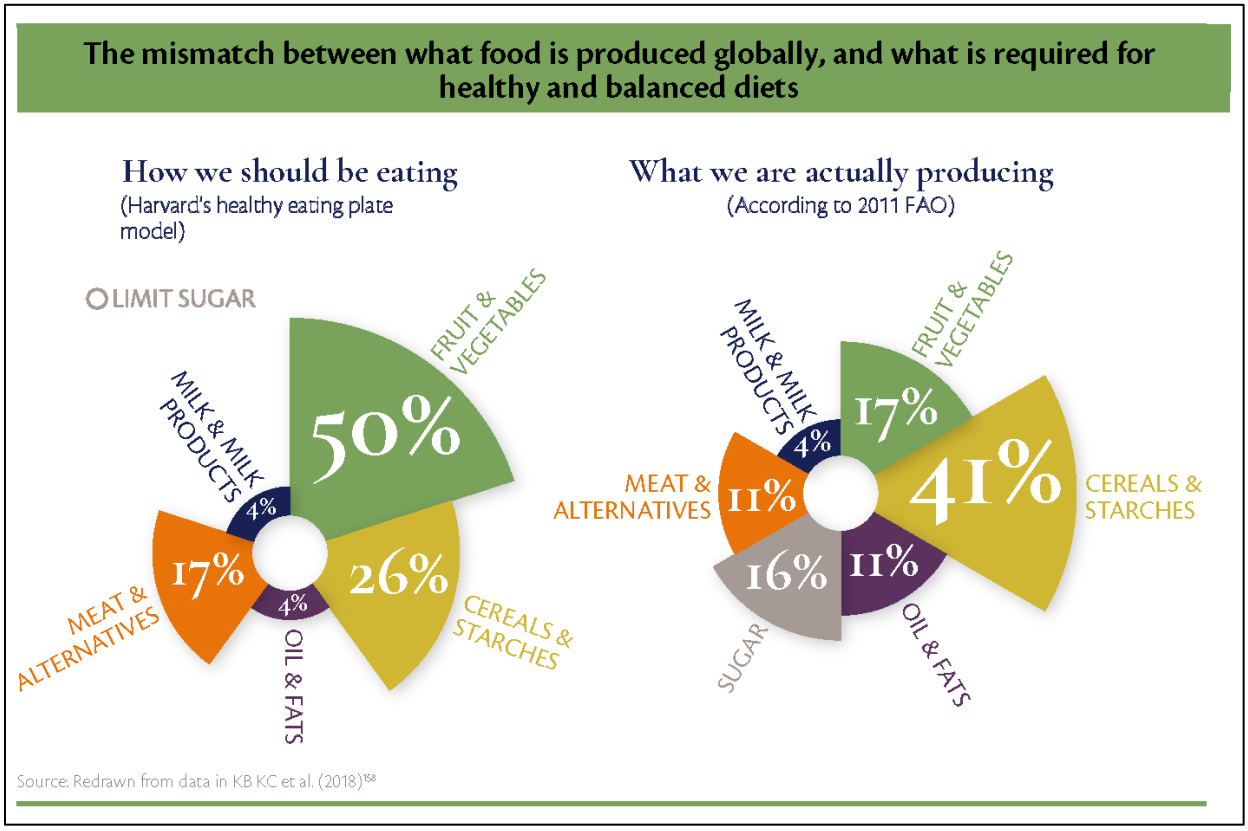
These issues where pre-eminent within the context of the United Nations Food Systems Summit, at which it has been suggested the importance of achieving a food consumption pattern that is more compatible both with human health requirements and with the requirements arising from environmental sustainability.[64] [65] [66]

[64] See, for example, UN Food Systems Summit Action Track 2 Discussion Starter "Shift to healthy and sustainable consumption patterns," December 2020.
[65] An extensive and full treatment of this matter may be found in Global Panel, *op. cit.*
[66] Only the issues relating to demand and composition of food demand as it relates to human health are discussed in this chapter. The issues relating to environmental sustainability are discussed in chapter II.

The concern over the current diet arises primarily because of the imbalance existing between its various components. The three main criticisms from the point of view of the nutritional quality of diets are the following: (a) The increase, in high-income population of developed countries, in the consumption of animal protein; b) Diets with high caloric content which, combined with a more sedentary life, lead to overweight. This problem is associated with the growing share of highly processed products that contribute to high-calorie diets; c) Insufficient intake of fruits and vegetables which contain vitamins, essential minerals and cellulose, all of which are important requirements in a balanced diet.

The magnitude of these imbalances may be seen in Figure 2.3. The Figure contrasts current diets, estimated on the basis of current production, with diets proposed as desirable. The contrast shows significant excesses in the production of sugar and cereals and, to a lesser extent, of fats and oils, which contrast with a significant shortfall in the production of fruits and vegetables and, to a lesser extent, of meat.

Figure 2.3. Composition of the world diet



These apparent food imbalances must be analyzed from the perspective of their relationship with human health. Correcting them should be a long-term goal, the end point of a long adaptation process.

The necessary diet changes

The link between diet and human health has been generally established by science. Recent estimates suggest that there are 20% premature deaths as a result, primarily, of heart disease, diabetes and diseases related to excess weight caused

by a nutritionally imbalanced diet[67]. The three most frequent and important imbalances in the global diet, which were mentioned above, have regional peculiarities and differences, as well as differences by population strata, according to financial capacity, which are extremely significant and which must be taken into account to characterize the problem and to determine the necessary corrective actions.

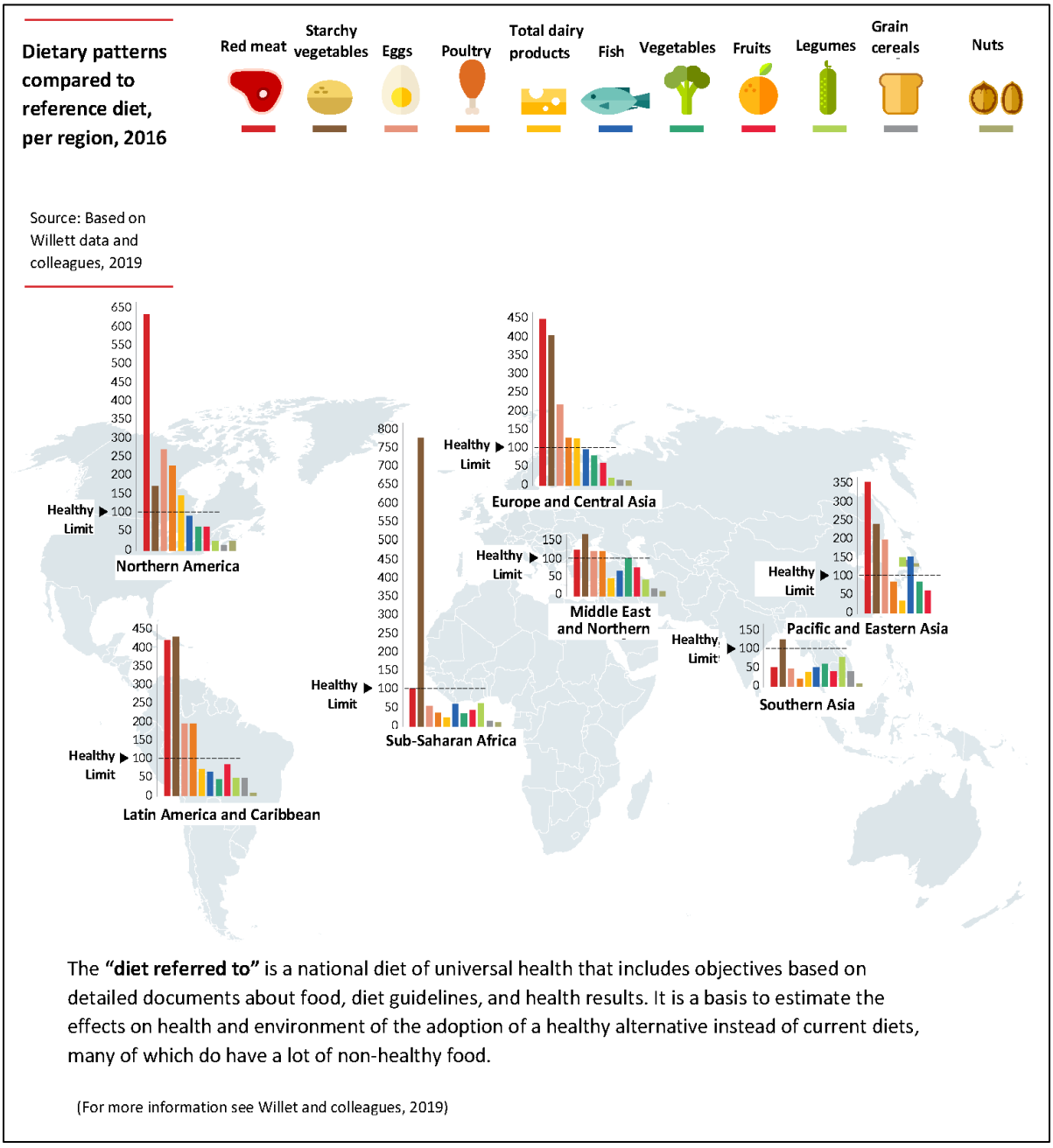
Animal protein consumption is an important component in the diet of most high-income countries. Scientific evidence suggests that excessive consumption of products of animal origin (meat and dairy products) is associated with cardiovascular diseases. How much is "excessive" is still a matter of debate. No doubt the diets of some countries such as the United States, Canada, Argentina, Uruguay, Australia and New Zealand as well as some European countries, where total meat consumption is of around 100 kg. per capita a year, are in the excessive consumption range.

Figure 2.4 shows the consumption of various food categories in the different regions of the world and their relationship with consumption levels considered desirable or advisable. It shows that meat consumption is far above desirable levels in some regions of the world, primarily North America, Latin America and Europe, where there are also significant differences among countries and population income levels. In the other regions, consumption stands below that recommended by science. In other words, in many developing countries, consumption of products of animal origin is meager and below the amounts necessary to ensure an adequate

[67] Global Panel, *op. Cit.*

diet in terms of the essential amino-acids that human beings need for their normal development and which are found, almost exclusively, in products of animal origin.

Figure 2.4



Very recently, the Belgian Royal Academy of Medicine has argued that pregnant and breast-feeding women and children younger than 14 years need to include

products of animal origin in their diet and, thus, they advice against vegan diets for that age bracket of the population. That group of consumers represents close to 30% of the world population.[68]

Accordingly, the questioning of consumption of proteins of animal origin should focus on the regions and consumer categories that represent specific situations in which consumption is actually excessive.

It is possible that evolution in consumption of proteins of animal origin may also be affected by progress made in developing laboratory substitutes made on the basis of products of vegetable origin. The dietary virtues and the negative externalities related to the use of energy and greenhouse gas emission (GGE) of the various technologies that are being used to produce such meat substitutes have not yet been studied in depth.

Consumption of sugar and flour derived from grain products and sugar cane is high, both historically and at present. These have been, and still are, the main basis of most diets and the main source of energy.

The main reason is their low production cost, which has allowed that the price of such products, per calorie unit, are low in comparison to other foods. The possibility of having diets with a high calorie content and low cost was a key element to achieve a significant reduction in global food insecurity in recent years.

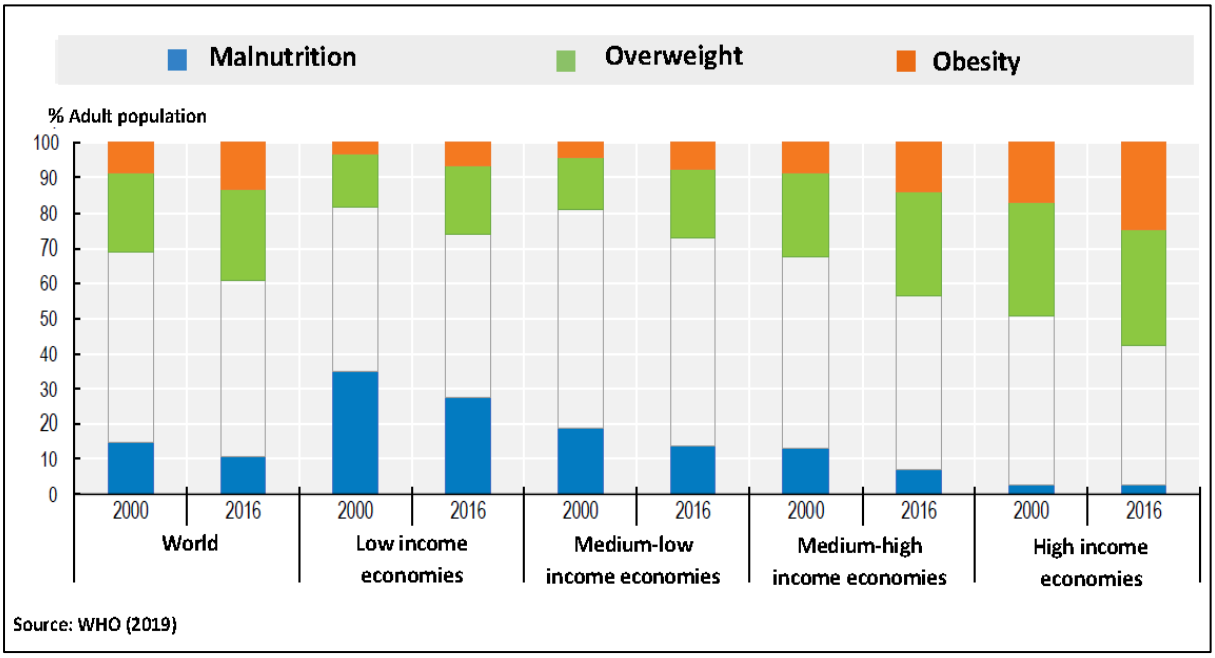
[68] According to the World Bank, children of up to 14 represent approximately 25% of world population. For their part, pregnant and breast-feeding mothers account for approximately 4% (authors' estimate).

Moreover, a diet with adequate carbohydrate content is also necessary from the point of view of human health. This is particularly true of rural workers and other groups that are making considerable physical effort, and in the population at large, for sports activities.

In recent years, demand for this type of food has grown and diversified through new products offered by the food processing industry. These products, such as, packaged french fries, biscuits and soft drinks, have a high palatability and are easy to manipulate and preserve, making them very convenient for the new feeding habits of urban life. These have been linked with the substantial increase seen in the overweight of large sectors of the world population.

As may be seen in Figure II.5 the percentage of overweight persons is substantial,

Figure 2.5 Malnutrition, overweight and obesity 2000-2016



is increasing rapidly and has exceeded the number of persons with food insecurity. It may also be seen that the differences, according to the income level of the countries, are significant, and that the problem is exacerbated when per capita income increases.

Overweight and the illnesses linked to this syndrome are associated with a number of attributes of modern life, such as sedentarism and the new eating habits, whose diets are based on high flour and sugar consumption. An important point to be highlighted is that this link between products with a high energy value and the potential nutritional problems mentioned above is particularly associated with the consumption of processed products rather than with the direct consumption of cereal, oilseed and sugar. Suffice it to note that cereals were the dominant diet in

most of the food cultures of the world on the basis of which the modern world developed.

Thus, the link between carbohydrate-rich diets and with excess salt, with non-infectious illnesses basically refers to processed products rather than to the direct consumption of products provided by primary production. Consequently, the main goal of public policies should focus on reducing consumption of such processed products rather than on reducing primary production of cereals and oilseeds, which are necessary to reduce food insecurity in the poorest sectors of the world population.

The advisability of increasing the ingestion of fruits and vegetables is a recommendation with broad scientific backing and should be part of the long-term goals in all countries. The design of such policies should recognize the significant differences existing between geographic regions and food cultures in the per capita consumption of such foods. In many regions, consumption of vegetables and fruits stands at nutritionally adequate levels. In others, a substantial increase in the consumption of such products needs to be achieved.

Achieving this will not be easy. Aside from changing the consumption patterns of large sectors of the world population, national food systems must also be adapted to this new potential demand. In order for subjective demand to turn into actual demand, i.e., consumption, vegetables need to be more available physically, and consumer access to them must be easier, coupled with a relative price lower than

the current one, which is very high by comparison with other food items, such as grains and oilseed by-products.

5. THE ADJUSTMENT PROCESS: THE COMPETITION BETWEEN ACHIEVING FOOD SECURITY MEASURED IN TERMS OF CALORIES AND ACHIEVING APPROPRIATE FOOD QUALITY LEVELS IN NUTRITIONAL TERMS

The goal of eliminating hunger in the world is far from being achieved. Nowadays, partly as a result of the pandemic, estimates indicate that there are over one billion underfed persons who are in a state of structural food insecurity. Accordingly, increasing food production at a sufficient pace is even today a key challenge for the global food system. Production needs to be increased to address the present problem of hunger and also to meet the additional demand that will arise both from population growth and from the higher per capita income.

Achieving this objective will require a significant effort at the global level to increase production and productivity throughout the entire food system and, complementarily, to reduce losses along the entire production, distribution and consumption process. As regards primary production, a special effort is required in the countries and regions that have the best natural resources and, thus, the ability to increase production in an efficient and environmentally sustainable manner.

With this objective in mind, it is important to note that the rapid expansion of food production achieved in the last 50 years was made possible through technological innovations, in a few crops, mainly rice, corn, wheat, barley, potatoes and soybean and, to a lesser extent, the legume family, that are consumed directly (beans,

chickpeas and lentils). This small group of primary products not only allowed for an increase in production, but also for a reduction in the price of food, which fell significantly, albeit with a certain variability, over the years (sees Figure 2.2).

The promotion of diets in which consumption of high caloric products, particularly those of industrial origin, is replaced by diets with a greater proportion of fruits and vegetables, is an important and necessary step in a significant proportion of diets in the world. However, from the economic point of view, this substitution in the food basket is not so simple to carry out for practical and economic reasons. Fruit and vegetable production and transport are far more complex and costly and incur losses that are far higher than those of other products. Accordingly, the price per calorie, at consumer level, is far higher in the case of fruits and vegetables than in the case of traditional crops and, accordingly, their substitution would entail, at least in the short term, a very significant increase in the average cost of diets. Recent estimates suggest that a diet that includes fruits and vegetables in a nutritionally adequate proportion would cost about five times more than a traditional cereal-based diet.[69]

This necessary transition will require both significant changes in consumer's food culture and significant transformations in the production systems as well as in transport and logistics. An important element of these transformations should be aimed at reducing losses, both post-harvest and in the distribution and consumption process.

[69] UN Food Systems Summit Action. Track 2 Discussion Starter, December 2020.

6. THE RESPONSIBILITY OF THE STATE IN THE ORIENTATION OF CONSUMPTION HABITS: AVAILABLE INSTRUMENTS

The transformations that are desirable and necessary as regards consumption patterns will require public policies aimed at changing cultural patterns and personal motivations that determine food demand. They must, as a starting point, recognize that food is a right of every individual consumer. The ultimate decision on what and how much to consume is, and must be, an individual decision of every consumer. Public policies directed to change feeding habits should be limited and focused on three large areas of work:

a) Consumer education at schools and through public information campaigns based on sound scientific evidence that indicate the nutritional needs of different population groups according to their age, occupation, health, etc. and the advantages and damage that certain diets or food habits could potentially produce.

b) Information on the nutritional qualities of food, particularly in connection with processed products, to improve consumer's ability to choose what they consume. This latter point focuses mainly on the development and implementation of a good labeling system for processed products. This subject is further discussed in chapter III.

c) Prevention, through the sound utilization of medicine**,** in order to be one step ahead and reduce the need for curative practices. Preventive health care that helps reduce illnesses that may be prevented by good eating habits and proper and timely use of drugs.

These three public policy instruments should be aimed at guiding consumer demand consistently with the nutritional guidelines provided by science. This statement does not mean that the State cannot implement economic policies aimed at providing incentives or levying taxes to offset the positive and negative externalities that may be associated with the production of certain products. This will be discussed, with particular reference to Latin America, in chapter IV.

1. THE ROLE OF INTERNATIONAL TRADE IN IMPROVING GLOBAL DIETS

International trade plays a fundamental role in world food security. Many regions and countries in the world do not have the natural resources required to produce the amount of food necessary for their population in an environmentally sustainable manner and at a reasonable cost. This situation is becoming more serious, particularly in the Middle East and in Asia, with population growth and an increasing food demand arising from higher per capita incomes. International trade plays an important role providing over 20% of the food consumed worldwide.

Current diets include a significant proportion of cereals, vegetable oils, products of animal origin and, to a lesser extent, legume seeds, which are products that are easy to transport and, quantitatively, the main products of international trade. A well-organized international trade, without commercial barriers and with an adequate infrastructure is a key component of a global and efficient food system that allows food supply to be ample and more diverse and to fully satisfy consumer demand. The current situation with respect to these conditions of international

trade is reasonably adequate, although there are still various restrictions on trade that remain in effect despite the efforts of exporting countries within the WTO.

Measures are being proposed within the context of the UN Food Systems Summit to achieve significant changes in food consumption patterns that would result in healthier diets.[70] As argued in the previous sections, such changes should focus on achieving greater consumption of fruit and vegetables and a reduction in the consumption of processed products with high sugar, flour and of proteins of animal origin in high-income countries and social strata, which have a higher average consumption than that recommended by science.

The diets suggested on the basis of scientific evidence include a greater proportion of fruits and vegetables, products whose transport and distribution are far more complex in five aspects: **a)** greater requirements during transport, including the need for cold chains in some cases; **b)** less bulk storage capacity and, thus, greater packaging and conditioning requirements; **c)** more complex sanitary requirements that are more difficult to comply with; **d)** greater post-harvest perishability until the first sale; and **e)** greater losses during transport and marketing.

All these conditions entail significant increases in the cost of transport and marketing and, thus, in the unit price of the product which explains why the recommended diets would cost about five times more than the current ones These characteristics and limitations of fruits and vegetables with respect to transport and marketing are a matter that requires priority attention. A research program and an

[70] See, for example, the Action Track 2 Discussion Starter.

international investment plan are essential elements in a global strategy aimed at improving diets worldwide.

CHAPTER III

THE GLOBAL FOOD SYSTEM: NECESSARY DIMENSIONS/ATTRIBUTES IN THE CURRENT WORLD

1. INTRODUCTION

In Chapter I, the evolution of national food systems and of the global food system where described. It was shown how the structure and operation of food systems have been evolving, from an initial situation where primary agricultural production was the central and dominant component, to the current situation where the global food system is composed of many diverse productive and commercial links that include multiple economic players that spread throughout the world. This set of processes and players, responsible for the production and distribution of food, compose the subsystem responsible for the production and supply of food.

On the other hand, consumers, responsible for food demand based on autonomous decisions and behaviors, compose the subsystem responsible for the demand that was analyzed in Chapter II.

The arguments developed in Chapters I and II make evident four important themes:

a) Human nutrition is provided by and depends on a complex global food system where many private players intervene under a normative framework defined by the public sector. The primary crop-livestock production is a minor component, from the perspective of its contribution to the GDP generated by the global food system. For example, in the USA the value of primary food production

represents only around 15% of the expenditure in foods made by consumers. The remaining 85% is associated to the processing, transport, logistics and trade activities. [71]

b) In spite of its decreasing relative importance, agricultural production continues to be an essential and central link for the whole global food system. Agriculture production uses agricultural resources (land, water, biological resources) that are scarce at a global level. Therefore, the food system must use these resources in an efficient manner to produce sufficient food to feed the world population at reasonable prices, that is to say, the global food system must be at the service of global consumers who determine, through their consumption decisions, the products that must be produced and the quality, and nutritional attributes they must have.

c) The global food system is composed of a broad set of national food systems closely related, mainly, through international trade. Such international trade has an important role. Over 20% of the food consumed in the world comes from imports. On the other hand, Latin America, especially the MERCOSUR countries, has become the main next exporter of food in the world. They contribute almost 40% of the net food exports being the main food suppliers for the rest of the world and, in particular, for those countries and regions that have food deficits.

d) However, the interrelations that exist between countries through the global food system are not limited to the goods provided through international trade. The global impact of food production and trade has, at least, other three dimensions: a) the environmental sustainability, especially in terms of the global

[71] **WWW.Economic Research Service. USDA**

warming produced by the emission of greenhouse effect gases (GEG), water pollution, etc.; b) the potential international transmission of animal and human diseases and c) the nutritional impact of exported foods that affect all the countries who intervene in international trade. These interrelationships and interdependencies, at a global level, between the production and consumption of food suggest the importance and need for a global food system that is efficient and meets the expectations of world population. Therefore, humankind has the huge challenge of achieving, through collective actions, a global food system that develops harmoniously and complies with a set of conditions that are directly related to the five dimensions/attributes, described below.

2. THE GLOBAL FOOD SYSTEM IN PERSPECTIVE

2.1 The national food systems and their participation in the global food system: Inter-relationships and trade-offs

The global food system is composed of interlinked national food systems, mainly, through trade, but also through other economic, biological and environmental relationships.

The national food systems are different one from the other and have evolved according to the stock of natural resources and the cultural and economic history of each country. Each of these national systems include a set of 5 dimensions/attributes that define: a) their productive features including productivity and efficiency, b) their relationship with the environment and the

natural resources, c) the quality and safeness of the food produced, d) the nutritional attributes of food produced and 3) their economic and social sustainability

From a global and regulatory perspective, even if the global food system is composed of the national food systems, it should respond to the demands and needs of global consumers in a balanced manner. This primary objective may have contradictions and trade-offs with the particular objectives of each country and, therefore, it requires negotiations and agreements to carry out global policies focused on the wellbeing of humanity as a whole.

2.2. The five dimensions/attributes that define the quality of the global food system

The development of food systems, both national and global, should mainly aim at achieving a food system that incorporates, in a balanced way, the five main dimensions/attributes. These five attributes are described as follows[72]:

A first attribute that the global food system must have is the capacity to produce the quantity and variety of foods necessary to satisfy the global demand for food at reasonable and time-stable prices.

As stated in Chapter I, achieving food safety and eradicating hunger in the world has been a central concern of humanity throughout history. This concern led the public policies and investments, both in the countries and in the work of multilateral organizations, directed to agricultural and food production. The Green Revolution

[72] The five dimensions/attributes have a certain symmetry with the themes of the Action Tracks of the CNUSA. Dimensions 1,3 and 4 are contemplated in Action Track 1, dimension 2 in Action Track 2 and dimension 5 in Action Track 4

implemented since the 70's, mainly based on the research carried out by the Consultative Group for International Agricultural Research, CGIAR, was a product of these concerns and it was a core instrument to increase the production and insure food security at a global level.

The success of this process was, from a productive perspective, fundamental and allowed for very significant increases in the productivity of agriculture as well as the production of food. The future challenge is how to sustain and increase food production efficiently using the scarce natural resources available in the world to meet the growing global demand. The search for global efficiency requires a comprehensive utilization of the resources available at a global level concentrating production in the most fertile agro-ecological regions of the world.

A second necessary attribute is that the food production be environmentally sustainable and not contributing to global warming.

The impact of agriculture on the deterioration of natural resources mainly water, agricultural land, forestry, wetlands and other fragile habitats is a consequence of the intensification of production and the insufficient utilization of conservationist practices. Even if the impact is essentially local, there are interrelationships at regional level and some, weaker, at a global level.

In the 90's, the evidence on global warming introduced a new dimension to the concerns related to the impact of food production on the emission of Greenhouse Effect Gases (GEG) and highlighted the strong global interrelationship there are in environmental matters.

The contribution of agriculture to the GEG emissions has received different interpretations. The estimations vary according to the consideration given to

carbon fixation by pastures used in livestock production and the considerable differences that exist in agriculture according to the agronomic practices used in. An additional element to be considered is deforestation as a negative element and the reforestation as a practice significantly contributing to carbon fixation

A third attribute of the food system is related to food safeness and, in particular, to the relationship between zoonosis and their potential relationship with human health. This concern has been present for a long time, especially associated to certain animal diseases that may affect human health, such as brucellosis or spongiform encephalopathy (mad cow) which are cases of special importance and concern.

The COVID-19 pandemic has generated a new importance and urgency to this dimension related to the safeness of food and the alleged link of the global food system and, in particular the trade component, in the spread of diseases transmissible to human beings.

The fourth attribute is related to the composition and the nutritional quality of food and its potential relationship with human health. FAO and other public and private organizations have pointed out to the growth of certain human diseases, such as obesity, diabetes and cardiovascular deficiencies that are strongly related to consumption habits associated to processed foods that have greatly increased with urbanization and economic development.

An example of this was the intense treatment of the issue in the G20/T20/B20 summit held in Buenos Aires in 2018 where the private sector (B20) presented an

important document committing to contribute to improving this attribute through diverse actions including the correct labelling of foods.[73]

Finally, a fifth dimension/attribute is the economic and social sustainability of food production. This dimension refers to the fact that the economic agents that take part in the productive process should receive a sufficient retribution to be able to, and also have the desire to, remain in the productive process.

Therefore, a balanced development of the global food system must take into consideration these five dimensions/attributes that are in the core of the discussions and proposal being considered in different Fora and, in particular, in the context of the Food Systems Summit organized by the United Nations.

A core point to take into consideration is that when there are multiple objectives, as is the case regarding the mentioned five dimensions/attributes, there are also trade-offs among them. There are trade-offs both between the dimensions/attributes inside the national food systems and between the national systems and the global food system.

Two simple examples illustrate the dilemma: 1) As regards a national system from the environmental sustainability perspective, it would be convenient to totally remove herbicides and most of the chemical fertilizers. But that would result in a significant reduction of productivity and, therefore, it would affect the price of food and food security in such country and 2) As regards the global food system, the same situation is replicated. If the countries who are big producers and net

[73] a) B20/T20 Joint statement on a sustainable food system. Buenos Aires 2018 and b) Sustainable Food Systems. Policy paper draft. B20 Buenos Aires 2018.

exporters of food adopt conservationist practices without adequately attending the productivity and efficiency levels, the available production at a global level will be reduced and the net importing countries will have difficulties to meet their import requirements at reasonable prices and their food insecurity will increase.

Therefore, the main dilemma is to achieve an adequate development of all food systems, including the global food system, integrating each of the five dimensions/attributes and keeping the appropriate balance between them. This balance will be different in different eco-systems and in different countries and the way in which these balances are developed in each country will affect, mainly but not uniquely through trade, the balance achieved at a global level.

This global interdependence and the importance of achieving an adequate balance to humanities current and future needs suggest the importance of countries working together in a coordinate manner and multilateral organizations adopting it as a priority mandate.

In the following sections, each of the five dimensions/attributes will be analyzed showing their relative importance, their quantitative dimensions and the possible actions and public policies necessary to steer the development of the global food system in an appropriate direction.

3. ENSURING A QUANTITATIVELY SUFFICIENT FOOD SUPPLY TO ELIMINATE HUNGER IN THE WORLD

3.1. The needs /demand for food at a global level

The global food system must be able to adequately nurture the world. That is to say, it must be able to provide food in a sufficient amount, at reasonable prices that are stable in time, and with sufficient variety and quality to satisfy consumer expectations.

There is a first limitation to satisfactorily meet this objective which is the limited amount of agricultural natural resources that are the basis on which food raw materials are produced. Therefore, the efficient and sustainable use of the natural resources must be a core component in the construction of a global food system. This will require a sustained effort in terms of investments and public policies to meet the expected increases in food demand at the global level

Recent FAO estimations suggest that the demand for food will expand 60% by year 2050. In order to respond to this demand, it would be necessary to increase the production by about 1.6% per year. This estimate is corroborated by projections made by OECD/FAO which indicate that the demand for food will increase an annual 1.5% to the year 2030. [74]

These estimations mainly arise from estimating the additional demand that will emerge due to population increase and the consumption increase that will derive from the higher purchasing power of the population. However, in order to have a full picture of the productive difficulties and the pressure that will be exercised on

[74] OECD/FAO Panorama 2030. Perspectivas Agrícolas 2020/2029, October, 2020

the agricultural natural resources, it is necessary to consider two additional impacts: a) the consumption derived from the elimination of the current food insecurity situations, and b) the qualitative changes in the consumption habits of the population. These qualitative changes will occur both due to the improvement in income of the population and to changes in the diet that are necessary to preserve human health.

The objective of eliminating global food insecurity in the next 10 years**,** a time at which the reevaluation of the compliance with the SDG's is scheduled, will mean a very significant additional increase in total consumption.

Food safety was defined in the food security summit held by FAO in 1996 as "Food security exists when all persons have physical, social and economic access to sufficient safe and nutritious food that meet their daily energetic needs and alimentary preferences to lead an active and healthy life at all times".

It may be seen that the definition expressly refers to the quantity of food and also to other conditions and attributes that must be resolved by the global food system. It specifically mentions access to food which is an increasingly urban problem related to the income and economic capacity of consumers.

In this sense, it is important to point out that the efforts made in most countries to eliminate hunger through the social policies implemented during the last two decades resulted in a rapid reduction of the global food insecurity measured in terms of consumed calories. The number of people with food insecurity has been reducing throughout the years very significantly. In 2017, prior to the COVID-19

pandemic, the United Nations estimated that the number of individuals with hunger was about 820 million. [75]

It is evident that this success, though significant, is still insufficient, especially facing the worsening of the situation during year 2020 as a consequence of the COVID-19 pandemic which is estimated to have increased the number of persons with food insecurity to 1.020 million[76]. Therefore, the elimination of food insecurity, in caloric terms, that still prevails in this high number of people, in a term of 10 years, will require an important additional effort of a global nature.

Food insecurity is associated to different phenomena. The most important is poverty which is concentrated in two specific geographic areas: a) the suburbs of big cities, something widely spread in Latin America and b) rural territories that are overpopulated as regards the existing natural resources and that due to their distance to urban areas do not have alternatives in non-agrarian jobs.

The elimination of this structural food insecurity will require economic changes leading to a better access to food by the poor population. But it will also require a substantial increase in food production and/or a reduction of the post-harvest losses to face these additional needs to those estimated by FAO and OECD/FAO projections. If the objective were to achieve that the almost one billion people who are underfed achieve a satisfactory nutrition level by year 2030, at least in their caloric component, it would be necessary to increase food supply by about 0,5 % annually during the next 10 years.[77]

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[75]https://news.un.org/es/story/2019/07/1459231#:~:text=En%20los%20%C3%BAltimos%20tres%20a%C3%B1os,padeciendo%20hambre%20en%20la%20actualidad.

[76] http://www.fao.org/3/a-i0876s.pdf

[77] Assuming that the one billion people with food insecurity have a caloric deficit of about 40 % of the recommended diet, the necessary additional consumption would be that of a complete diet for 400 million people.

These estimations suggest that the increase of total food consumption, measured in calories, should be of about 2.1 % annually during the next 10 years until year 2030: 1.6 % to cover the estimated increases of demand plus 0,5% to eliminate the current food insecurity: a very important figure that, as shown below, will be quite hard to reach.

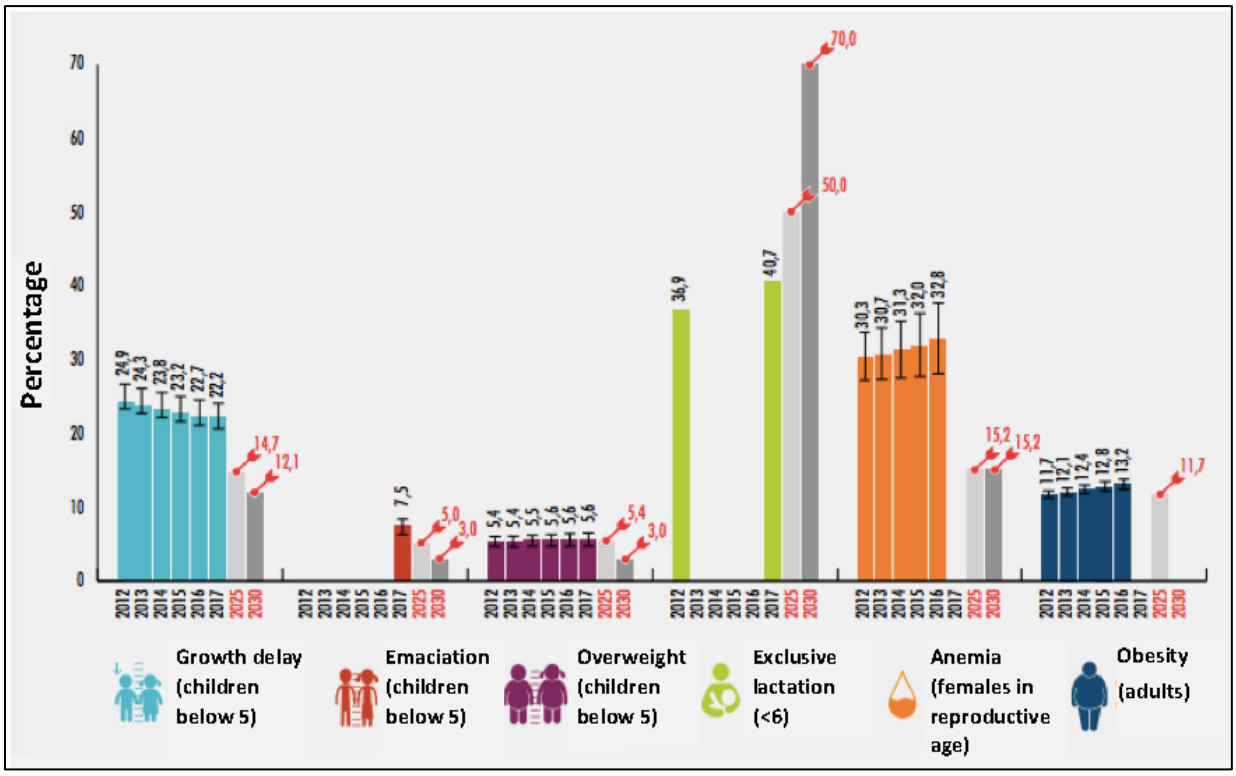
Additionally, it is necessary to consider the impact of the needed changes **in the composition of food demand due to cultural changes that are occurring in consumers.** These changes will be concentrated on a higher demand of fresh fruits and vegetables, mainly in high-income countries, and of animal proteins, especially in Asian countries, as a result of their important increases in income per capita.

These products that will have a higher demand are more difficult and expensive to produce and their production, measured in calories, requires a larger utilization of natural resources per unit of product. Therefore, these changes in the composition of consumption will result in a stronger pressure on the natural agricultural resources, especially land and water.

On the other hand, as mentioned before, there is also food insecurity of a nutritional nature. That is to say, there are people who are not able to complete healthy diets that include sufficient essential amino-acids, vitamins and minerals for a normal development and a good health. Figure 3.1 shows the importance of some types of nutritional deficiencies currently existing. Resolving these dietary

These 400 million represent a little more than 5 % of the current global population. That is to say, eliminating food insecurity for year 2030 would require an increase of the production of about 5% of the current production which means an annual increase of approximately 0,5%.)

Figure 3.1 Sources of Nutritional Food Insecurity



Source: FAO. Evolution of the different forms of malnutrition.

deficiencies will require larger intakes of animal proteins, vegetables and fruits that, in general, have a higher price per unit of product.

This analysis suggests the enormous productive effort that will be necessary to achieve a supply of sufficient, and nutritionally adequate, food to insure the objective of a world without hunger by year 2030.

3.2. The necessary productive transformations to eliminate hunger in the world by 2030

Succeeding in the difficult objective of eliminating hunger in the world will require a qualitative leap in the organization and functioning of the global food system. An

increase in the production of food of about 2.1% per year in a context of little to nil expansion of the cultivated area and an increase in the consumption of vegetables, fruits and animal proteins, that have a high density in the use of natural resources, specially water, will require important changes in the economic policy and substantial increases in investments and in the intensity of technological innovation.

In regards to the economic policy, it is necessary to achieve an adequate macro-economic stability and a favorable economic and productive context for the production of food. To such end, it is necessary an economic policy that contemplates adequate prices and enough incentives for the whole food production chain so that it is capable of increasing production, efficiently and sustainably, in each country and especially in those who are big food producers at a global level. The needed economic policy will be different in each country and in each particular situation and it must address all the productive sectors which compose the food systems.

An additional core element is the implementation of an important investment program in logistics, infrastructure and telecommunications especially related to the food systems that allows for the modernization of production and distribution of food. An important component of these investments is a special consideration to those directed at reducing post-harvest losses and at broadening the activities involved in bio-economy, including the concept of circular economy.

The importance of innovation as a core element for production and productivity increases in primary production is a widely recognized fact. During the 2010-2020 period, the annual global increase of crop and livestock production in Latin America

was of 2% and of 2.5% respectively. [78] Should this significant production growth continues in the future it would be almost sufficient to achieve consumption increases compatible with the elimination of hunger at a global level for year 2030. However such production increases, achieved in most of the regions in the world, was a consequence of two factors: a) the expansion of the area under production, partly as a consequence of the incorporation of forest areas for crop and animal production; and b) the increase of productivity per hectare.

It is evident that, in the current context where the concerns about the conservation of natural resources and environmental sustainability have taken a new dimension, a further expansion of cultivated land is essentially impossible except for some relatively limited spaces still available in Latin America and Africa.

Consequently, the necessary increase in food production of 2.1% estimated above, must come almost exclusively from increases in the total productivity of factors of production and particularly from the land which is the scarcest factor.

Recent studies such as CERES 2030 have identified an important number of technologies that allow a sustainable increase of food production and have identified the incentives that have been effective to achieve a rapid adoption of the most appropriate technologies in each particular situation. [79]

These and other studies are an important step to provide the necessary knowledge to achieve an intensive and sustainable use of natural resources. On the other hand, other studies point out the limitations of productive systems based on agro-ecology

[78] http://www.fao.org/3/y3557s/y3557s03.htm

[79] CERES 2030 Sustainable Solutions to end Hunger. Summary Report. 2020 y Pineiro Valeria, et al. Achieving sustainable agricultural practices: from incentives to additional outcomes IFPRI Policy Brief 2021

or on agronomic practices focused on the protection of natural resources without considering the productivity of the used resources. In the absence of high productivity and production the objectives of effectively eliminating rural poverty or feeding the world appropriately, would not be met.

A new element to consider that could contribute to a better supply of food is the recent developments, conducted mainly in the USA, to produce both animal proteins and generic foods from vegetable products. These scientific achievements could be an important contribution to the production of food although new questions arise as regards their impact on the GEG emissions and the use of power.

This highlights that in the current food systems, primary food production is not the only source of food available to the end consumer. Food supply also depends on the development of a food processing industrial system and a complex distribution and marketing system that offers food to consumer that are mostly urban. These links in the productive chain, representing about 85% of the expenditures in food made by consumers, must also be efficiently developed to respond to the rapid expansion of consumption.

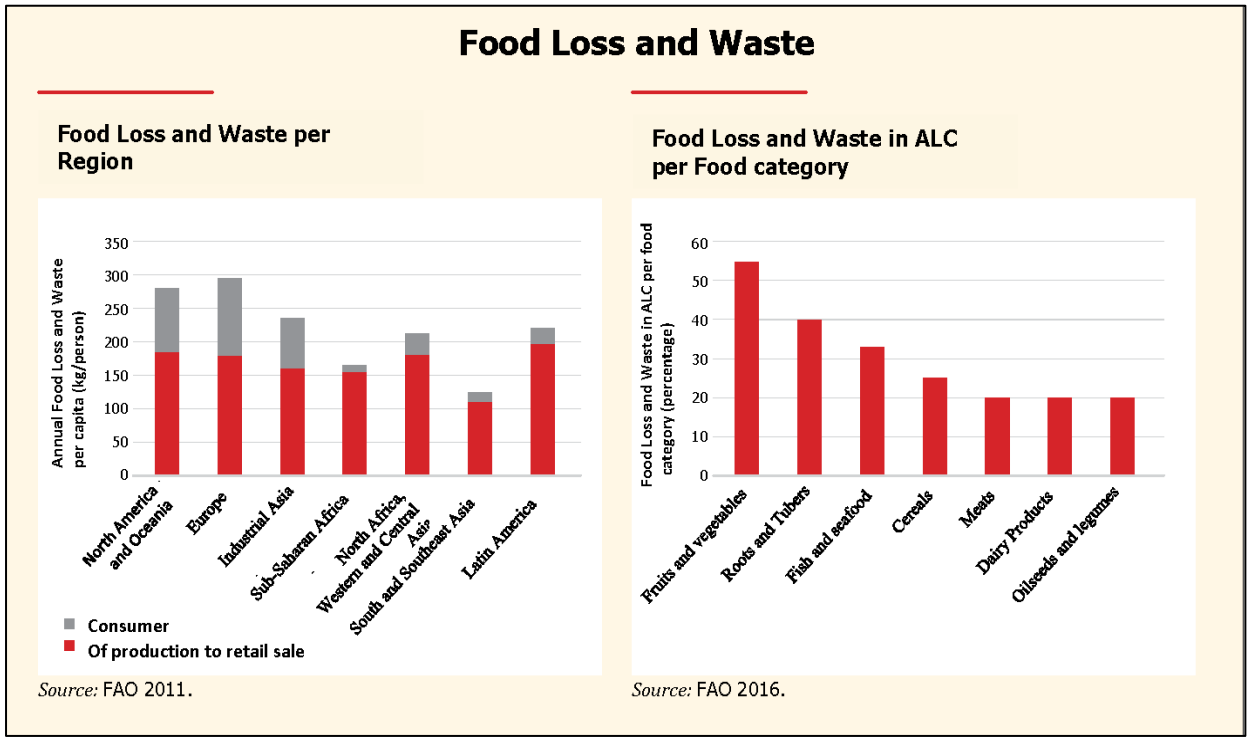
3.3. The importance of reducing food losses

An important instrument to increase the actual supply of food at the disposal of end consumers is the reduction of food losses that occur throughout the productive process. The estimations about the quantitative importance of these losses are variable and have not been carefully documented. However, FAO estimations

indicate that in Latin America, they fluctuate between 20 and 50 % of the production for the different food categories. [80] (See Figure 3.2)

[80] Morris et al op cit Panoramas alimentarios futuros: Reimaginando la agricultura de América latina y el Caribe. BM, 2020

Figure 3.2



3.4. International trade to respond to the geographic imbalances between national consumption and production

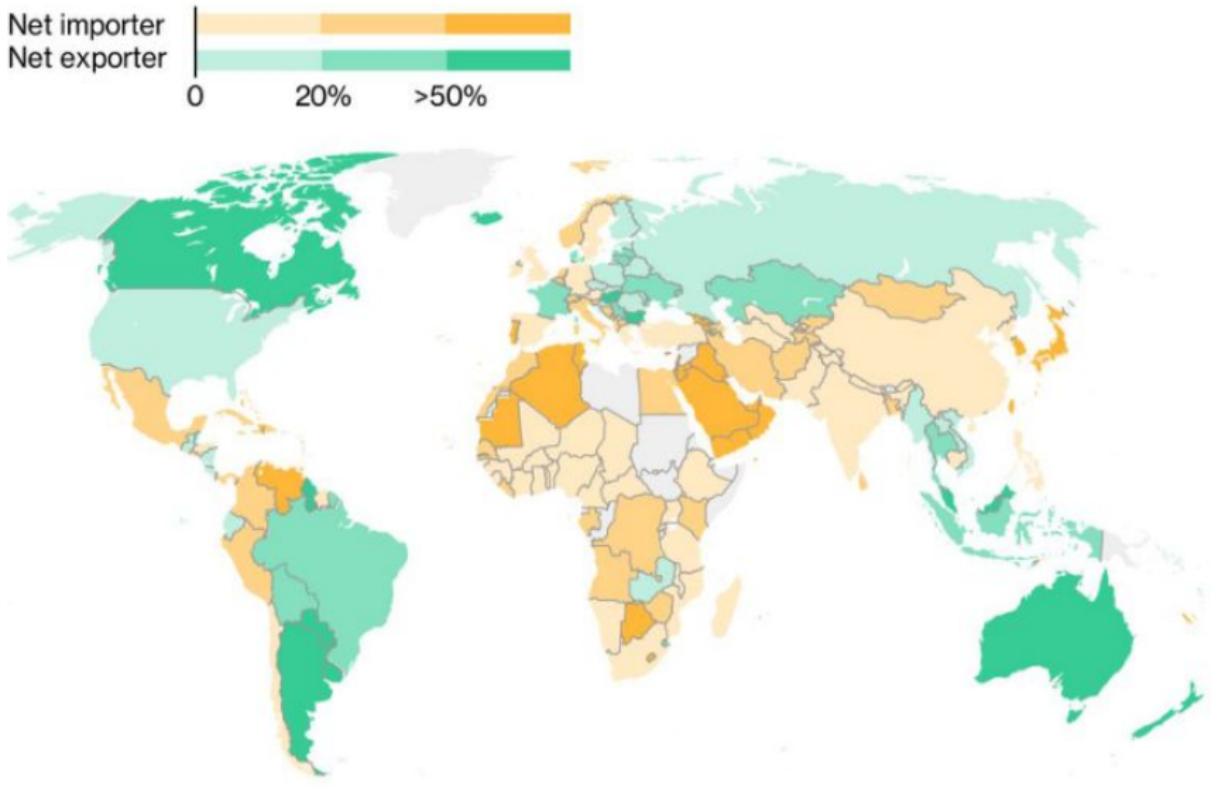
Food insecurity and consequently the objective of eliminating hunger in the world for year 2030 is relevant in all regions, and specially so in some developing regions, especially in Africa, Asia and the Middle East and trade has an important role to play in fulfilling this objective

This is so because food consumption and food production have a very unequal geographic distribution. While demand/consumption is concentrated in countries with large populations and growing incomes per capita, mainly in Asia, production is concentrated in regions which are well endowed with agricultural natural

resources. Consequently, the current and future capacities to produce food sustainably, at reasonable costs and in quantities exceeding the needs to feed their own population, is concentrated in few regions of the world, including the Western Hemisphere, Europe, Eastern Europe and Oceania. That is to say, regions where food demand is lower than their capacity to produce them.

This imbalance between the need for food and the capacity to produce it, a phenomenon that has increased notably during the last two decades, results in some countries being forced to import food to meet the needs of their population. Figure 3.3, shows that the need to import food is concentrated in African countries and some of the Asian countries.

Figure 3.3 Net Food import and exports at a global level

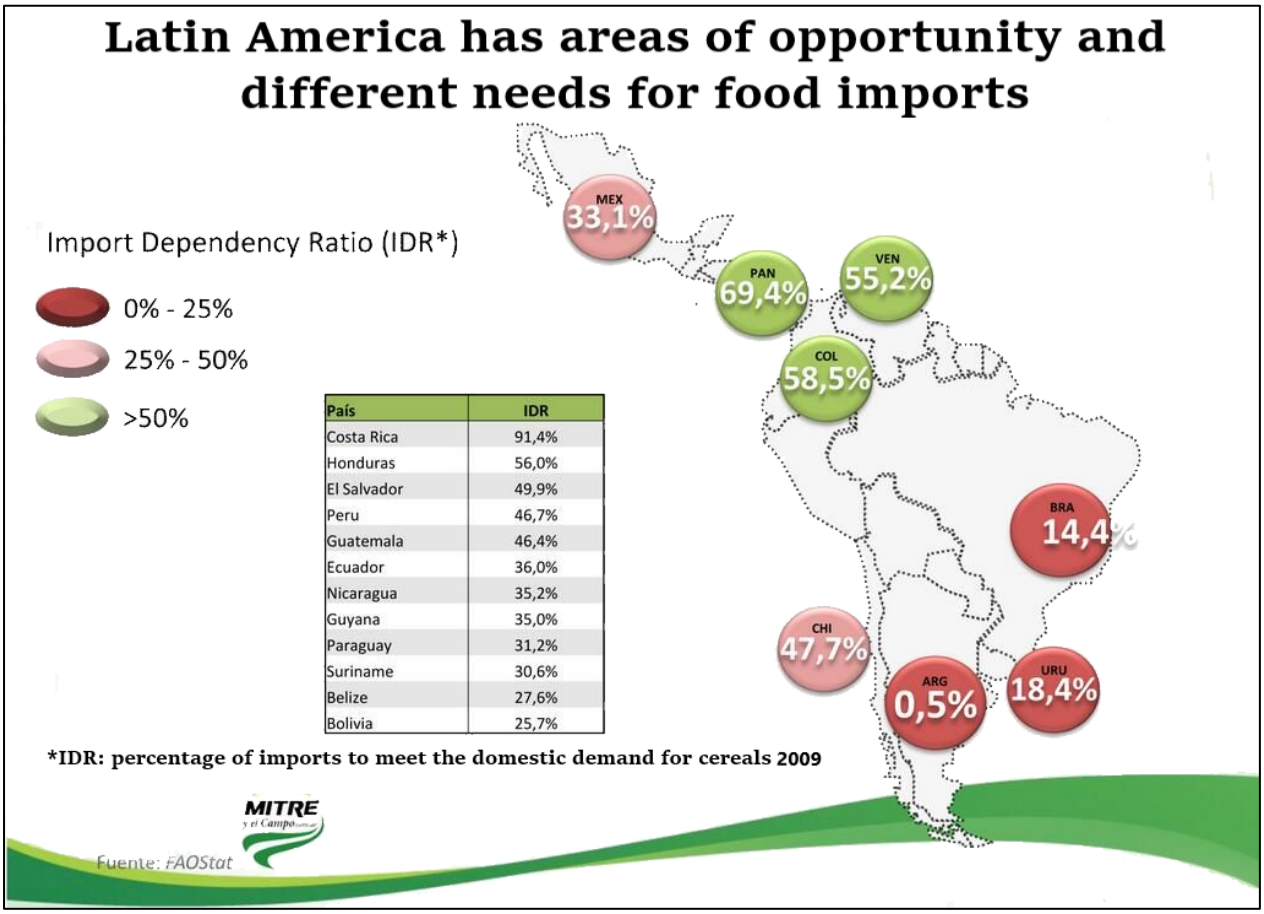


Source: Bloomberg based on FAO Global perspectives

This situation results in an important international food trade as a compensation mechanism to achieve food safety at a certain level in all the regions of the world. This international trade requires, and has been governed, by a set of multilateral regulations and trade agreements that contribute to the free mobility of food.

On the other hand, these geographic imbalances are also present within the western hemisphere that is the main net food exporting region. Figure 3.4 shows, that Latin America and the Caribbean include regions that are highly dependent on food imports and others, mainly MERCOSUR, that are net food exporters.

Figure 3.4

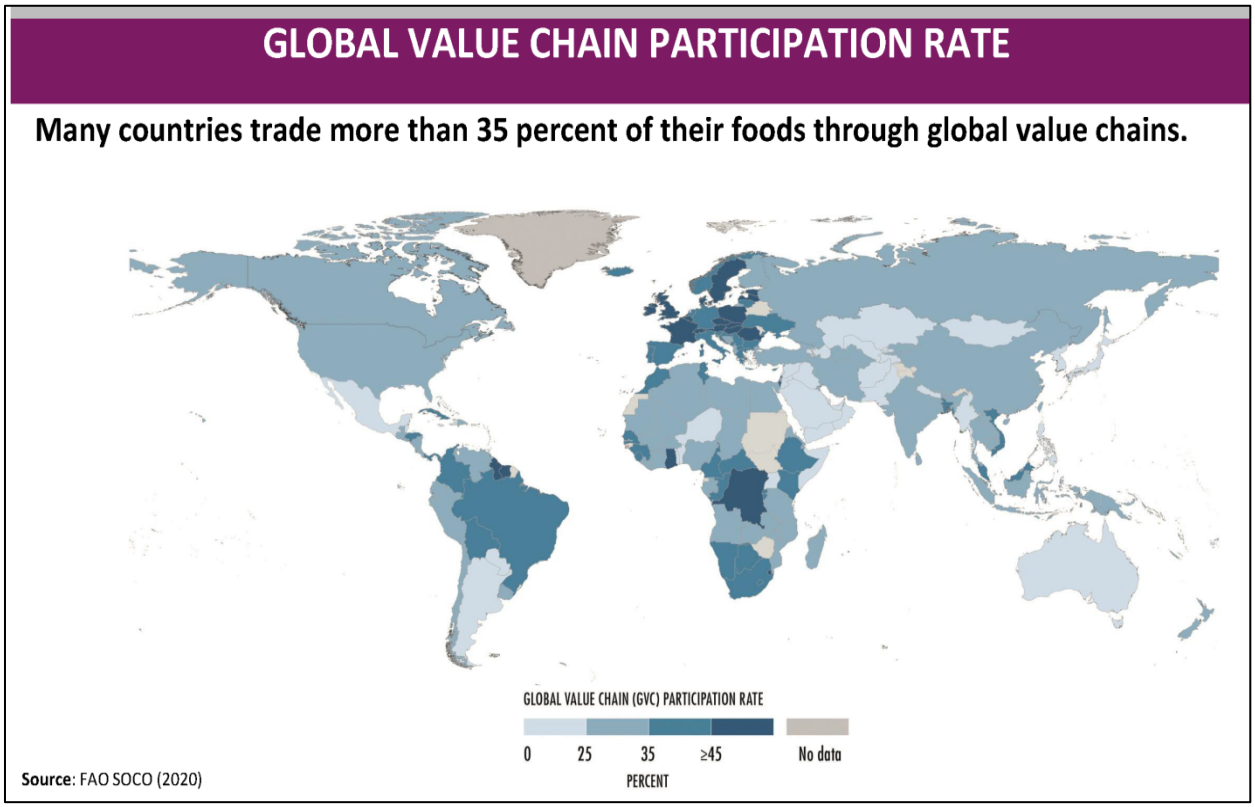


País	IDR
Costa Rica	91,4%
Honduras	56,0%
El Salvador	49,9%
Peru	46,7%
Guatemala	46,4%
Ecuador	36,0%
Nicaragua	35,2%
Guyana	35,0%
Paraguay	31,2%
Suriname	30,6%
Belize	27,6%
Bolivia	25,7%

These arguments show the importance of trade as an instrument to eliminate hunger in the world. However, three important challenges have emerged during the last decade which needs to be addressed.

The first challenge refers to the implications of intra-firm trade. Figure 3.5, shows the growing importance of trade within the global value chains, including intra-firm trade, that establishes particular business rules parallel to the existent multilateral rules and which facilitates the utilization of private standards which could represent an additional restriction to food trade.

Figure 3.5



A second challenge is the weakening of multilateralism in general, and of the World Trade Organization (WTO) as the body in charge of safeguarding it.

Finally, the growing importance and pertinence of new requirements and/or standards, linked to environmental sustainability parameters, food safety regulations and desirable nutritional aspects or attributes of food. These standards will potentially impose changes in the organization of production and add significant difficulties for exporting countries and, in particular, for small and medium size food producing companies. These aspects will be developed in the following sections pointing out the nature of the issue, the forms that the new adopted trade standards have developed and the possible policies and actions that will be necessary in the production and distribution of food at a global level.

These challenges must be taken into consideration to insure that the international trading system continues to contribute to an efficient flow of food from the regions and countries that have surpluses to those that depend on imports to achieve their food security at reasonable prices. It is important to emphasize that food imports represent over 20% of total global food consumption. [81]

International trade is governed by multilateral rules agreed within the scope of the WTO and is framed in a broad number of regional and bilateral agreements. The progress, in terms of trade liberalization achieved after the Uruguay Round and especially with the creation of the WTO, has been considerably less significant in regards to agriculture where there still are important restrictions to trade. Achieving an efficient food system requires both a wider liberalization of agricultural trade and the reduction of costs related to transport and logistics.

[81] a) https://www.wto.org y b) FAO: Torero, Máximo, PP Presentation 2020

4. INSURING ENVIRONMENTAL SUSTAINABILITY [82]

A dimension/attribute of food systems that is receiving special attention on the part of the international community is environmental sustainability. This includes the concerns related to the role of food production in global warming and the issues related to the conservation of natural resources such as water, soil and biological diversity. These legitimate and important concerns are receiving great attention both at country and international level, especially since the signature of the Paris Agreement. The challenge is understanding the strong interrelation existing within food production, between environmental sustainability and the other four necessary attributes and, in particular, the production capacity at a global level.

This understanding is necessary to achieve concrete actions that enable the attainment of the mentioned objectives of reducing emissions and protecting the agricultural natural resources without affecting the food production capacity at a global level.

4.1 Food production in the context of global warming and its CO2 capturing potential

Climate change brings about unprecedented challenges for the global society. There is a common understanding, elaborated within several international instruments such as the United Nations Framework Convention on Climate Change (UNFCCC) (1992), the Kyoto Protocol (1997- 2005), the Paris Agreement (2015), in regards that the world temperature increase must be kept, during this century, under 2°C with

[82] This section and the following about safety were prepared by Sabine Papendieck. The authors are grateful for her excellent contributions)

respect to the pre-industrial levels, and to continue the efforts to further limit the temperature increase to 1.5°C.

The proposed joint action tends to achieve the maximum point of GEG emissions as soon as possible. With this purpose, both the private and public sectors in the developed and emerging countries are involved in the Race to Zero for 2050, proposed by the United Nations. The focus of these actions is to implement an efficient environmental management, tending to minimize direct and indirect emissions and to compensate through CO2 sinks, in order to decarbonize anthropogenic activities on the planet and reach a balance that would allow economic development without extreme effects on the climate.

Like every anthropogenic activity, the food production systems impact on the local and global environment I different ways. It uses approximately 50 % of the planet's inhabitable land[83] and represents 19-29 % of total global emissions of greenhouse effect gases, out of which 80-86 % come from agriculture and livestock production[84]. According to OECD-FAO data, it is estimated that in the 2019-2028 period, assuming there are no changes in the currently used technology and public policies, the growth of GHG emissions direct from agriculture, forestry and other land uses will be 0.5 % per year[85]. It is important to point out that different productive systems and products have different environmental impacts, therefore, it is necessary to start approaching food environmental sustainability through the analysis of the lifecycle of individual products adjusted by the local practices. In particular, in

[83] Tilman, D. and Clark, M., Global diets link environmental sustainability and human health, Nature, 2014; 515: 518-522.
[84] Vermeule, S. J., Campbell, B., and Ingram, J., Climate Change and Food Systems, Annual Review of Environment and Resources. 2012; 37: 195-222.
[85] OCDE-FAO, Perspectivas agrícolas 2019-2028, 2019.

regard to primary production, the direct emissions (mainly nitrogen and methane) and indirect emissions (carbon emissions due to change in the soil use), should be adjusted by the carbon sequestration (in foliage, roots and soil) that agricultural activities may generate. The net emission that result are very important information in the path towards carbon-neutrality. The analysis of the food systems net emissions should include the emissions by other related activities including processing of raw materials, packaging, transportation, cooling, retail, restaurant and domestic consumption, and finally, under the concept of a circular economy, the waste and reuse or final disposals (cradle to cradle).

Consequently, even though primary activities concentrate a high percentage of total emissions of the food system, it is also part of the solution to the climate change problem through efficient carbon absorption. This concept of carbon absorption is contemplated in the definition of Climate-Smart agriculture, which combines agricultural productivity and income increase with adaptation and generation of resiliency to climate change, and the mitigation and absorption of greenhouse effect emissions. Even though there is currently no potential inventory of the global capacity for carbon absorption by the food systems, FAO's estimates suggest that the quantity of carbon fixed in the crop soils as organic material of the soil coming from cultivation and manure, can be increased by 50% if better management procedures are introduced.

In a similar way, emission produced by grazing activities can be absorbed if trees are planted in the same areas. A lower rate of deforestation, together with regeneration and planting of trees could reduce the carbon dioxide emission in a significant manner.

4.2 Carbon leakages through food trade

At a multilateral level, the Paris Agreement demands all the Parties to do everything in their power, through their contributions at national level, and to periodically report on their emissions and implementation efforts, which should represent a progression beyond the previous one. Developed countries should continue to exercise their leadership by setting absolute reduction goals for all the economy, whereas emerging countries should continue to intensify their mitigation efforts, while they are encouraged to move forward towards achieving the goals of reducing emissions in the economy in the light of the different national circumstances.

The Paris Agreement proposes the preparation of a global inventory every five years, as of 2023, in order to assess collective progress towards reaching the goals of the agreement. At the same time, the UN publishes a Gas Emission Report which presents the latest information about disparity between the levels of emissions estimated for 2030, and the levels required to comply with the temperature goals set forth in the Paris Agreement. The 2019 report, specifically estimates the emissions associated with exports and imports and provides a better perspective of the impact of consumption and trade. This analysis shows that the net carbon incorporated in trade flows go from third world to first world countries. Therefore, even when first world countries reduce emissions in their own territories the incorporated carbon in their import activities partly offsets their mitigation efforts. This is translated into higher per capita emissions in demanding markets than in exporting countries. These carbon leakages through imports mainly coming from countries with more lax regulations are starting to be corrected by the destination

countries through environmental regulations across borders so as to ensure equal treatment for locally produced products and imported products, either through environmental taxes or through new emission threshold requirements, in order to discourage environmentally inefficient trade.

4.3 Other environmental impact categories and their mitigation potential

Within the multiple public and private environmental standards currently in force, the highest impact of this type of certifications and/or environmental statements is on food. There are currently different calculation methods for various categories of potential environmental impact based on the life-cycle analysis. Carbon balance is just one of them. Other categories of environmental impact that revolve around food production are, for instance, water footprint, loss of biodiversity, deforestation, depletion of organic carbon in the soil, direct and indirect change of soil use, eco toxicity, presence of particulate matter in the air, acidification, eutrophication, among others[86].

According to the Living Planet 2020[87] Report, food production is also responsible for 29% of the global greenhouse effect gas emissions, 80% of deforestation, 70% of the use of fresh water, 50% of the loss of water biodiversity, 70% of the land biodiversity and 52% of soil degradation. At the same time, agricultural systems have a huge potential to mitigate all those negative aspects, not only through the equivalent carbon sequestration, but also providing habitats to animal species and

[86] Categories of environmental impact quantified in food, included in the global surveying made by the Product Environmental Footprint initiative led by the European Commission.

[87] WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. Almond, R.E.A., Grooten M. and Petersen, T. (Eds). WWF, Gland, Switzerland.

creating vegetation corridors. It has been broadly documented that sound environmental management is also crucial for a better food production, being the protection of pollinators a good example of this.

The occupation of marginal land for agricultural production is the main cause of deforestation and fragmentation of forests, and the loss of forest biodiversity. As mentioned in the State of the World's Forest 2020 Report[88], large-scale commercial agriculture (mainly beef cattle breeding and soybean and palm oil cultivation) was the cause of 40% of the deforestation of tropical forests between 2000 and 2010, and local subsistence agriculture was the cause of another 33%. Ironically, the resiliency of the human food systems and their capacity to adapt to future changes depend on that same biodiversity, therefore, a new close interdependence between them is more present than ever.

Water is an essential resource for life and only 2.5% of the water available on planet Earth is fresh water, and out of this fresh water, 68.1% is ice, 30.1% is ground water and only 1.2% is superficial water.[89]

As to global use, domestic consumption takes 11% of fresh water, industry takes 19% and agriculture the remaining 70%. As an example of the use of water in agricultural production it can be pointed out that, at global level, livestock production requires 2422 Gm3 of water per year. One third of this volume is for beef production and cattle breeding, 19% for dairy products, another 19% for pig production, and the rest for other types of animals. Of the total volume, 98% refers to water consumption for the production of animal food, and the remaining 2% to

[88] FAO and PNUMA 2020. The state of the world's forests 2020 Report. Forests, biodiversity and people. Rome. https://doi.org/10.4060/ca8642es

[89] UNESCO wwap-waterfootprint

hydrate animals and service waters[90]. Here lies the importance of an efficient management of the water resource in the food chain. In a particular way, the efficiency of the water footprint is not only measured in regard to consumption, but also with respect to the availability of the resource in the specific place and at the specific moment. When the water footprint is combined with all the production in a geographic location during a specific period of time, it is possible tp measure if that production has crossed the sustainability threshold and whether this production is sustainable or not. At the same time, through food trade, virtual water contained in that food flows to to destination countries. Some exporting countries are starting to limit the production of products that are intensive in virtual water so as not to impact on their total water consumption. On the other hand, countries with scarcity of fresh water (40% of the world population is currently affected by the scarcity of fresh, clean, safe water) can supply food, which contain virtual water, to their population through trade. The efficiency of the water resource then has an important meaning in environmental sustainable development, linked to Sustainable Development Goal 6.

After the oceans, the soil has the second largest natural carbon sink, and it exceeds the capacity of forests and other vegetation to capture carbon dioxide from the air. Given that the soil is a non-renewable resource, the shift of its use for anthropogenic activities brings along different consequences including acidification, as a consequence of pH reduction, salinization, the imbalance of nutrients (deficiency and excess), contamination, loss of soil biodiversity, loss of

[90] Hoekstra, A.Y. (2014) Water for animal products: a blind spot in water policy, Environmental Research Letters, 9(9): 091003.

organic carbon, among others. Therefore, the need to conduct a sustainable management of the soil through agricultural and livestock activities is raised again.

In this aspect, the following activities are encouraged through the Global Soil Partnership: crop rotation with fixers of N, the sustainable management of fertilizers and chemical pesticides, conservation tillage and non-tillage or zero tillage system, and enlarging and maintaining a protective organic cover on the surface using cover crops and stubbles. Regarding the loss of organic carbon in the soil, which is one of the main threats for the soil functions as carbon sinks, the FAO estimates that the global stocks of carbon are distributed in 450-650 Gt carbon in vegetation and 640- 2.344 Gt carbon in the soil which is 2 to 3 times more carbon than in the atmosphere. Consequently, agriculture and livestock farming should have as a main objective to avoid carbon release from the soil and sequester more carbon where there is a potential. This is a major proposal of the 4x1000[91] initiative launched by France in 2015. In order to encourage these soil re-carbonization practices, the carbon credit markets in the primary stage of the food chain could be an interesting instrument.

In conclusion, ensuring the environmental sustainability attribute of the food systems is justified not only by its intrinsic capacity to mitigate climate change at global level, but also to build environmentally sustainable food systems without sacrificing the productive capacity and/or international trade activities necessary to reach global food security.

[91] An annual growth rate of 0.4% of the soil carbon reserves, or 4 ‰ a year, in the first 30-40 cm of soil, would significantly reduce the CO2 concentration in the atmosphere due to human activities.

5.BUILDING FOOD SYSTEMS THAT PROTECT HUMAN HEALTH [92]

Food safety has been a central concern both for consumers and governments. Foods can be transmitters of domestic animals diseases, which have economic consequences (foot and mouth disease) and also those that might affect human health. These health risks have resulted in regulations and control systems which are very important in the productive and commercial areas. The recent COVID-19 pandemic has generated a new and intense concern and fear about the potential role of food trade in the spreading of human diseases, fears that could affect the global food system structure and behavior.

On the other hand, food can also be contaminated with active residual chemical products that might affect human health. This has resulted in regulations about scientifically set limits which are an important component of the commercial agreements and affect the structuring of food systems.

5.1. Food safety as an essential attribute

As it is concluded in the UN 2030 Agenda, all the people are entitled to a sufficient and nutritious diet to foster their personal development. In this sense, food is essential for the promotion of health and the eradication of hunger, which in the current context requires that there is food supply beyond the national borders. Unfortunately, to this date, the OMS estimates that 600 million people, approximately 1 out of 10 in the world, get sick every year after eating

[92] This section was prepared by Sabine Papendiek. The authors thank her excellent contribution)

contaminated food. Out of these, 420,000 people die, including 125,000 children under the age of five[93]. Young children suffer 40% of the food transmitted diseases, which has a strong and direct impact on population curves, since they represent only 9% of the population. In addition, it is known that food may cause over 200 acute and chronic diseases, from digestive tract infections to cancer, being of an infectious or toxic nature, caused by bacteria, viruses, parasites, or chemical substances.

Consequently, a good functioning, the world food system requires implies tha it provides a key attribute: **global food safety.** There is no food safety without product safety and any adverse incident related to food safety can negatively affect the countries, exhausting the healthcare systems[94] and damaging national economies, trade and their international reputations. Recent WHO and FAO estimates indicate that unsafe food causes, to low and middle income economies, around 95,000 million USD a year in productivity losses.[95] At the same time, the absence of food safety causes food losses and the waste of natural resources.

In order to reach a good level of food safety it is necessary to acknowledge that food is more vulnerable than any other basic product, since it can be affected by: **1)** contaminants unintentionally added in their production, packaging, transportation or storage processes, or even from the environment; **2)** microorganisms resistant to antimicrobials as a consequence of the misuse of antimicrobial in animals and vegetables[96] and **3)** contamination due to pesticide

[93] OMS estimates about the world load of food transmitted diseases, OMS, 2015.
[94] The load of food transmitted diseases for public health is comparable in scope to that caused by TB, malaria and HIV/AIDS.
[95] Guide for the World Food Safety Day 2019, FAO, OMS, ODS.
[96] The WHO estimates that every year die approximately 700,000 people for causes related to resistance to antimicrobials.

residues used in livestock farming or in the primary production of products utilized in industrial processes.

Therefore, there are food risks which, given that they cannot be perceived through sight, smell or taste, require special attention to ensure that the way in which food is produced, commercialized and consumed is safe for the consumer. Safety is a shared responsibility.

5.2 Regulatory harmonization plus management and communication of risk assessment, at the international level, as key conditions for the food system resiliency

National food systems interconnected at world level through trade require, in order to insure global food safety, a coordinated international management of food safety. The expansion of agricultural trade has increased the availability and the affordability of food, but at the same time, it has increased the possibility for non-safe or unhealthy food produced in one country to affect the health of consumers from another country.

This is where the Codex Alimentarius performs a key task. With a representation larger than 99% of world population, the Codex collects food regulations (191), guidelines (76) and codes of practices in ongoing evolution thanks to the contributions of scientific experts and of member countries, under a common understanding of what food safety means. It would be impossible to imagine international trade of food products without regulations. Thanks to this

standardized environment, taken as an impartial point of reference, consumers can trust the safety, quality and authenticity of food.

At the same time, as it is acknowledged in the General Guidelines of Codex, these regulations must promote a global harmonization, in order to facilitate free trade. If every government applies different food standards, trade becomes more costly and it would be very difficult to insure that food is safe and meets consumers' expectations. In this way, through the harmonization of standards, trade becomes less costly and more inclusive. It is the Agreements on Sanitary and Phytosanitary Measures (SPA) and on the Technical Barriers to Trade (TBT) of the WTO and their notifications systems the ones that guarantee that they do not become barriers to trade.

In addition, it is recommended by Codex to apply an approach based on the Hazards Analysis and Critical Control Points System (HACCP) in order to improve food safety, as well as to encourage the application of risk analysis. In this regard, FAO, WHO and the *Codex Alimentarius* Commission have advanced considerably in the preparation of a systematic framework to apply the principles and guidelines of risk analysis in relation to food safety. This framework is based on the functional division between risk assessment and risk management to guarantee the scientific integrity and Independence. The last step in the process is the communication of risks.

The outbreaks of trans border diseases have increased in the least years, placing food safety at risk. In order to approach this challenge, the setting of the Food Chain Crisis Management Framework (FCC) by FAO has been very important It is an approach that combines prevention, preparation and response to food chain emergencies.

To do all that, it is necessary to invest and strengthen the development of national capacities for a proactive food control. When a country deals with these needs, its participation in the food regulation system and food trade becomes proactive, its contributions relevant, and the results, reachable.

Many factors within and outside the food production systems could drive, either directly or indirectly, to the appearance of hazards, risks and problems for food safety. The outbreak of COVID-19 has shown the need to implement a change that had been taking place in the last years: move from “reaction and response” to a “prediction and prevention” approach, which enables the early identification of the possible emerging problems and their prevention. Exploration and prospective methodologies and approaches have been widely used in different sectors for many years and, more recently, in food safety to identify possible hazards and mid- and long-term opportunities. In this way, it will be possible the construction of a more resilient world food system, which can prevent outbreaks and, at the same time, be capable of supplying safe food during global crises.

5.3. The “one health” approach: food safety plus environmental sustainability

Food production has to accompany the projected demographic growth. It is estimated that global population in 2050 will be approximately 10 billion people on planet Earth. At the same time, the increase of income produces a higher demand for animal products. In a world where there are more people and animals, the outbreaks of diseases may spread faster than in the past, and more so because the greater interconnection through trade. Some diseases affect only animals or only human beings, but certain animal diseases also place risks for humans, and new

diseases of this type keep appearing regularly. Recent estimates suggest that out of the 1415 pathogenic agents that affect human beings, 61% are of zoonotic origin.

This situation implies a problem for disease surveillance, in addition to the fact that outbreaks can have devastating effects on local production and trade. In this way, food safety is closely related to the environment around us and to the organisms which are utilized to produce food. Currently, 60% of the contagious diseases come from animals, and of these, about 75% come from wild animals[97]. The appearance of these diseases is correlated to a high human population density and a great diversity of wildlife, and is driven by anthropogenic changes such as deforestation and the expansion of agricultural activities, the intensification of livestock farming and the increase of wildlife use. In accordance with this interconnected reality, FAO, OIE and WHO have approved the "One Health" holistic approach, a framework of common collaboration to deal with human, animal and environmental health issues. This initiative promotes the exchange of information and capacities among the health, agriculture and livestock farming, veterinarian, environmental and food safety sectors in order to support the prevention, early alert and mitigation of situations that jeopardize the health situation and may have an impact on trans border trade. The goal is to prevent a new pandemic, and this is where the safety attribute of food systems interrelates with the environmental sustainability attribute.

5.4 Traceability as a response to consumer demand

[97] Living Planet Report 2020, WWF.

Consumers are increasingly more aware of food safety issues, as well as of the need to be selective with the food they buy from supermarkets and stores. They expect their governments to adopt legislative and regulatory measures to ensure that only safe foods, both local and imported, are sold, and that health risks are minimized. That is why keeping consumers informed about the life cycle of food, from the field to the table, turns traceability into one of the main management tools in food safety matters.

This traceability demand has been strengthened due to the COVID-19, and there is greater awareness in regard to sanitation and its role in the transmission of diseases. A doubt has been raised as to whether food can contribute to the transmission of the virus caused by COVID-19. Since, to this date, there is no scientific evidence that proves that the virus can be transmitted through food an additional question has been raised regarding the possible transmission in the surfaces of packages and containers. As a consequence, world food production and distribution activities have had to pay more attention to communicate, to their intermediate and end consumers, the implementation of protocols tending to reduce points of virus transmission risks through the physical contact of packages and containers used in food trade activities.

The fact is that Coronaviruses cannot be multiplied in food rather they need a human or animal host to reproduce themselves. Even though it is virtually improbable for a person to get COVID-19 through food or food packaging, food chains have had to work on traceability from primary production to the shelf, and even to the table, in order to avoid penalties from consumers.

All of this shows the needs from governments, both individually and collectively at a global level, to guarantee that: a) agricultural and food producers adopt good practices in order to ensure a sufficient supply of safe food, b) that operators of food companies, from processing to retail, guarantee compliance with food safety programs, and c) that consumers exercise their right to a safe nutrition through an informed purchase. That is to say that food safety is a shared responsibility that becomes a fundamental requirement of national and global food systems.

4. THE NUTRITIONAL DIMENSION/ATRIBUTE IN FOOD SYSTEMS

The main issues related to consumption guidelines and nutritional problems have been identified, described and characterized in Chapter II. This section is focused on describing the existing links between the nutritional aspects and the economic conditions consumers face and the set of policy instruments available to face the problems involved.

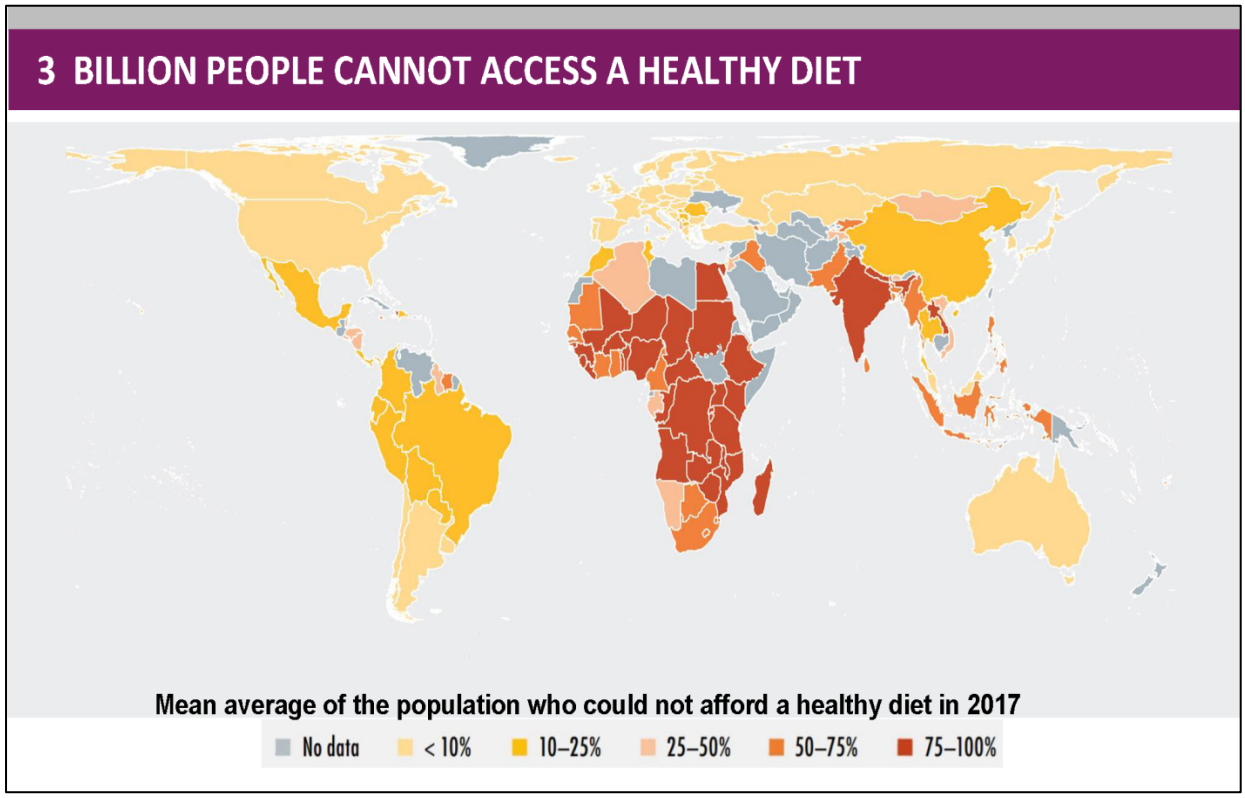
As argued in Chapter II, the national or cultural diets, that is to say, the most extended diets in each country and/or cultural group, were built based on the most abundant and available food in the territories where these social groups developed. A classic example of this is the importance of beef in the countries surrounding the *Rio de la Plata* in South America, roots and tubers in some African regions, or corn in Mexico and Meso-America. These diets, though highly dependent on one product, or on a small number of products were, however, sufficiently varied and nutritious to allow the development of these societies.

This observation shows that, to the extent that food consumption is closely related to primary production, and consumers have an economic situation that guarantees

their access to food, the adaptability of human beings allows them to survive and thrive in diets that include very different combinations of products and generally do not include a great variety of products.

In the present world, these conditions are not always present. On the one hand, poverty, highly spread in the current world, hinders the access to food in sufficient amount and quality to many consumers. On the other hand, the development of complex food systems, inherent of our times, have progressively developed a wide marketing, processing and distribution chain that gets between the primary production and end consumption, putting consumers far away from the agricultural producer and radically modifying the way in which primary products are ultimately consumed. This has resulted in that an important percentage of people in the world do not have access to healthy diets. (See Figure 3.6)

Figure 3.6 Persistence of Unhealthy Diets



Source: Global Panel op.cit

Such diets may be unhealthy mainly because they lack essential amino-acids, vitamins and minerals that are mainly provided by animal proteins and fresh vegetables and fruits which, in general, have a high market price and, therefore, are difficult to access by low income consumers, especially the urban ones.

Therefore, the existence of an important number of individuals that do not consume well-balanced diets from the nutritional standpoint has three main reasons:

a) The first and probably most significant, from a quantitative viewpoint, is related to the fact that many families do not have sufficient income to be able to afford nutritionally proper diets.

b) A second cause is insufficient education on the nutritional value of diets and on the importance of consuming proper diets from a health point of view. This is particularly important as regards industrialized products that have a high palatability and are easy to acquire and consume but may lack quality attributes.

c) Finally, a third cause is connected with the relatively high cost per unit of food products with the highest dietetic value, in particular, animal proteins together with fruits and vegetables.

Consequently, the solution to the existence of non-healthy diets is strongly linked to two economic issues: a) the total numbers of low income social groups that exist in each country b) the macroeconomic policies, in particular income support and food subsidies that are implemented by governments.

In addition to the economic policy and food subsidies that improve the capacity to access food on the part of poor consumers, it is essential to work on the efficiency and productivity of the food system so that nutritionally proper diets are more affordable increasing the capacity of poor consumers to access them.

Consequently, there are three main lines of action which are extensively used in many countries but should be strengthened at a global level. **First,** achieving higher production and productivity in the production of these nutritionally necessary foods, including higher efficiency in their distribution and marketing, both at national and global levels, so as to reduce their price and improve access for consumers. **Second,** developing genetic modifications in mass consumption crops in such a way as to improve their nutritional value. An example of this is the golden rice developed by the International Rice Research Institute (IRRI) with a higher content of vitamin A. These works should be accompanied by an intense

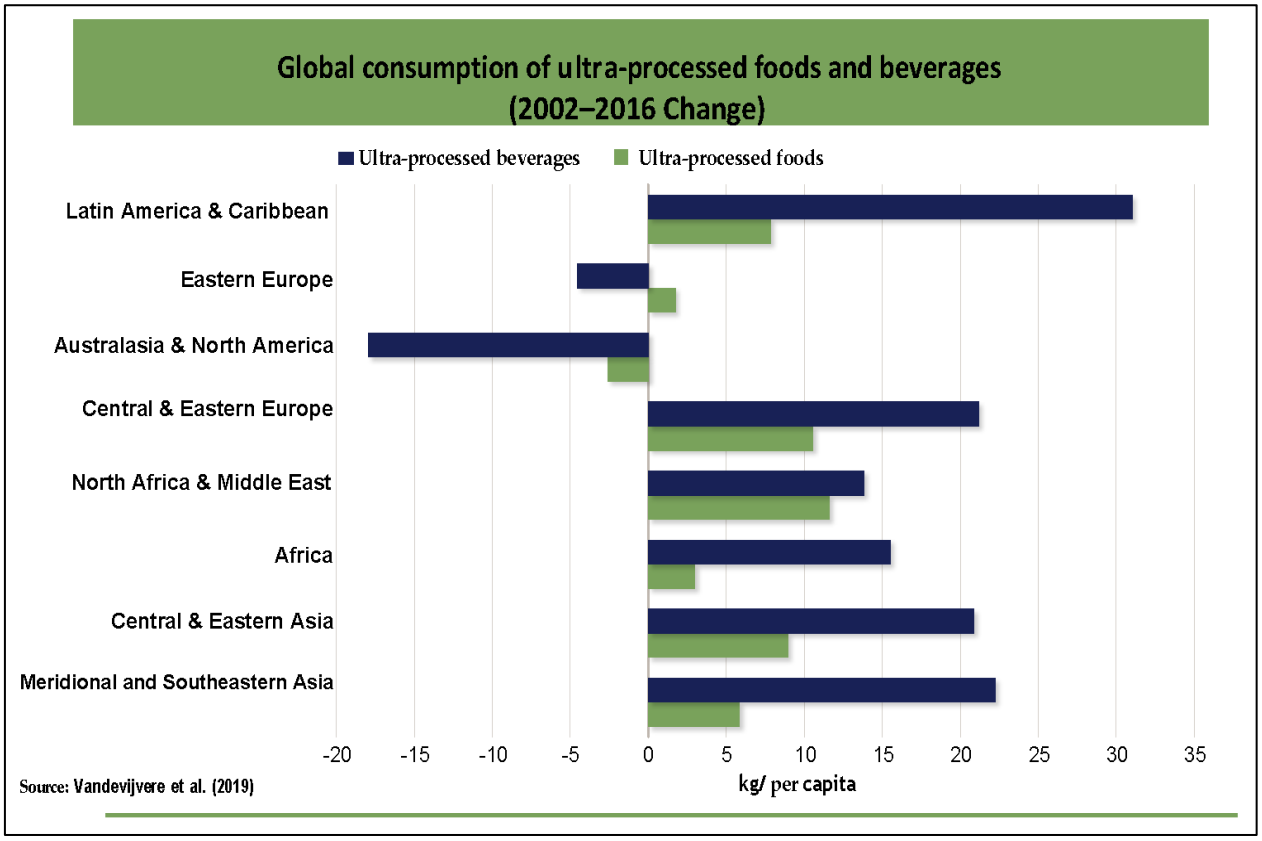
information and education campaign, based on scientific evidence, in order to reduce consumer reluctance, and increase their consumption and **third,** spreading and promoting home vegetable gardens both in rural and peri-urban areas, and even in fully urban zones. There are many successful experiences as regards this topic, both in Argentina and in other Latin American countries that have been documented by FAO[98].

In addition, it is necessary to improve consumer education and information, a topic developed in Chapter II. A key element to improve consumer information and to facilitate the identification of the nutritional attributes of processed foods is the labeling programs.

In the past decades, a significant proportion of foods, especially cereals and oilseeds, which are the basic components of the diets of a wide majority of consumers, especially urban ones, are consumed after complex industrial processes. This industrial elaboration offers new products with organoleptic and nutritional features that are quite different from those of the primary products used in their preparation. These processed foods have, in an important number of cases, a higher concentration of carbohydrates, especially sugar, and/or fats and/or salt, which makes them very attractive to consumers, but potentially harmful for their health. This problem is illustrated by the increasing presence of diseases related to nutrition such as obesity, diabetes, gluten intolerance and

[98] www.FAO.org/3/y5112s/y5112so3

Figure 3.7 Consumption of ultra-processed foods and beverages



food allergies in general which have raised concerns about the relationship of food patterns and these human diseases. In particular, obesity and diabetes, diseases with high morbidity, which have evidently expanded in recent years.

Recent estimations suggest that diabetes affects almost 10% of the global population and more than 30% of the global population is significantly overweight, a percentage that is growing. [99] (See Figure 3.1)

[99] https://www.fao.org/3/ca5162es/ca5162es.pdf)

The main social response to these food related pandemics has been campaigns to improve consumer information as regards the nutritional attributes of processed foods. This would seem to be the main instrument to achieve a better nutrition of the population in general and should be a priority for all governments.

However, another important element is to provide the necessary information on certain nutritional attributes of processed foods so that consumers may take the best decisions at the time of purchasing or consuming such foods. For this to be possible, it is necessary to have governments implement the necessary regulations that are useful for consumers and that also have a reasonable level of acceptance by the food processing private sector.

An example, which has had enormous success, are the labelling rules indicating whether the food contains gluten or is gluten free (wheat, rye and barley) which makes it possible to alert consumers who are gluten intolerant. This labelling has also allowed and encouraged the production of specific products that, in time, have managed a great acceptance by consumers.

A specific policy that is slowly spreading is the mandatory labelling where the content of sugar and fats of all processed foods is indicated. Even if there is a significant number of countries that have legislated on this issue, imposing certain labelling obligations on food processing companies, this initiative has found reluctance on the part of the private sector based on two main arguments. The first is that the labelling rules have been approved independently in each country and therefore have not been harmonized. This situation represents, especially for small and medium size companies, a non-tariff barrier because it requires a specific packaging and, therefore, an additional cost for each of the countries to which

products are exported. The second reason is certain discrepancies on the information that is to be provided and the specific manner to do so.

This discussion suggests that the labelling system to be implemented should result from an international agreement defining a unique system at a global level. That would facilitate its implementation on the part of the companies who produce and export processed foods that would not have to adapt the labelling to particular regulations of each of the countries to which they export.

The document prepared by the B20 for the G20 meeting, held in Buenos Aires in 2017, presented a modern and forward looking view on the topic, that suggests the willingness of the private sector to advance on a global policy on nutritional labelling [100]

Within the framework of the existing global institutionality, the Codex Alimentarius managed by FAO, could undertake the responsibility for leading this process. This points outs the need to create more effective and politically more powerful mechanisms to drive a global labelling policy and the preparation of additional actions that could contribute to a better consumer information.

It is worth asking whether these two actions – consumer information and a global policy regulating and implementing the nutritional labelling at a global level – would be sufficient to achieve a better nutrition at a global level. It is hard to know! However, these two steps are necessary and potentially useful and would outline a path on which other policies could emerge in a supplementary manner.

[100] a)B20 op.cit y b) The labelling system installed in Chile has had good acceptance in other countries such as Mexico

5. ECONOMIC AND SOCIAL SUSTAINABILITY

The economic and social sustainability of food systems is a concept that has no accurate, and widely accepted, definition in technical writings. The following definition will be used here: "the economic and social sustainability of a productive system is associated with the principle that the economic agents who take part in it receive a retribution sufficient to guarantee both, an appropriate compensation to those factors of production involved in the productive process, and a personal retribution, or company profit, that justifies their permanence in the activity"[101]

In an stylized (even utopic) description of a market economy, the amounts produced of goods and services and their market prices, are determined by supply and demand that, in turn, determine the retribution both to the economic agents as well as to the production factors. This is the mechanism that determines, through competition, the capacity of the economic agents to stay in the activity. This supposes the existence of competitive markets, with symmetrical and complete information, access to productive and technological resources and other type of conditions necessary for all the economic agents to face comparable situations in regards to market competition. These conditions are not fully present in most cases in the real world and this has led to different forms of State interventions aimed at correcting the existing imbalances and complements the way in which the market operates. This is particularly true in agricultural production that has specific

[101] Se hace la distinción entre retribución personal o ganancia empresaria para incluir adecuadamente tanto a las explotaciones familiares como a las empresas agropecuarias.

particularities and more rigidities and imbalances than other sectors in the economy. In particular, in agricultural production there are externalities, both positive and negative, of considerable importance. Particularly important examples of positive externalities are the role of agriculture in the preservation of rural landscapes and national cultures, and the potential negative impact of the degradation of natural resources and the CO2 emissions and their impact on global warming, as negative externalities.

These issues have been widely discussed in academic writings and also in many official documents where the objectives and policies for the agricultural production are defined. In general, it is recognized that in agriculture: **a)** producers face imperfect markets, both for products and in relation to access to land and other inputs necessary for production and **b)** that both positive and negative externalities require specific state interventions in order to promote desired economic and political objectives.

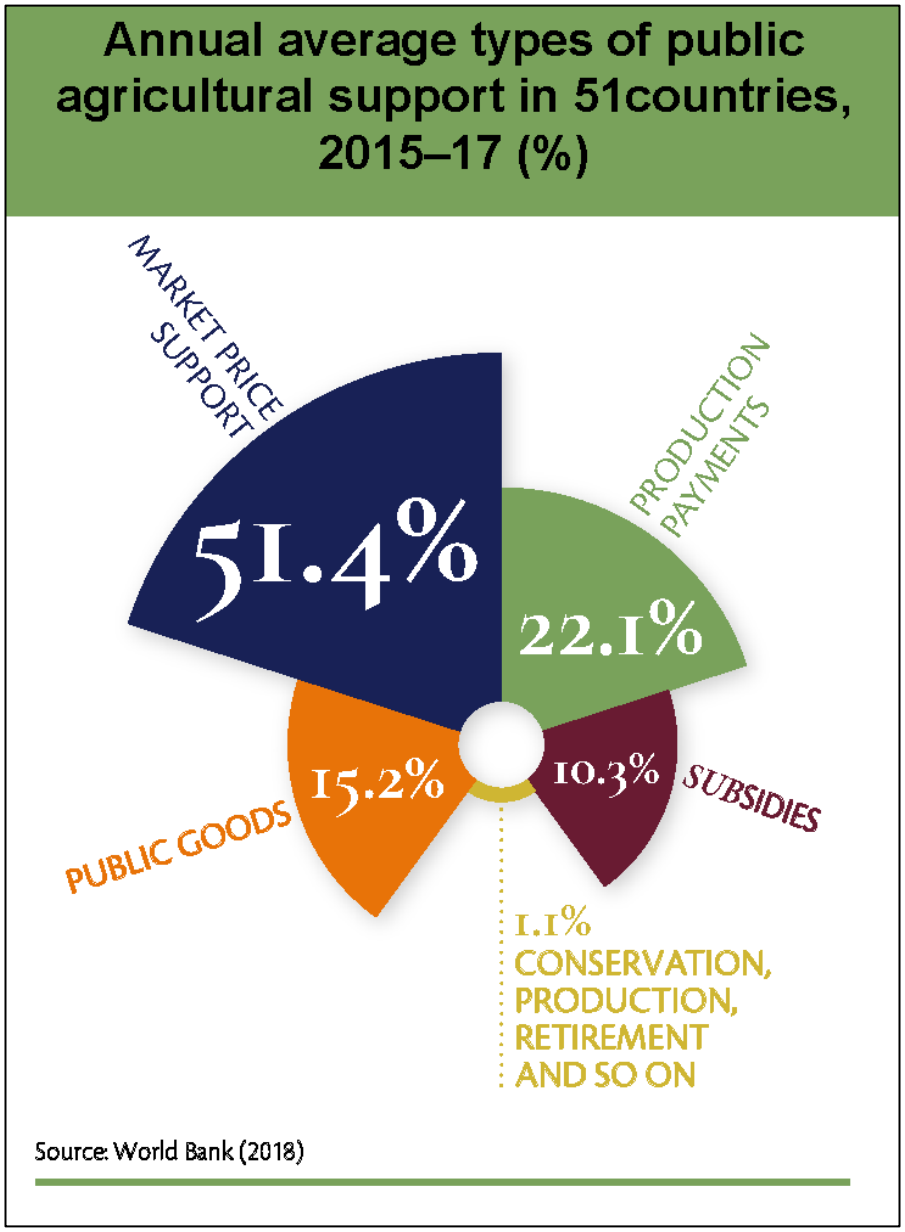
Moreover, in many countries, especially in developing ones, there is an important number of agricultural producers that do not have the technological conditions and/or the economic dimension needed to organize efficient productive processes. Small economic dimension linked to distant markets, the lack of communications infrastructure, the imperfection of the land markets and other inputs, the difficult access to credit and many other factors, make it especially difficult to compete in the market with other productive units that are better positioned geographically and economically. These difficulties to compete are even biggest as regards the international market where such producers must compete with the agricultural production of third countries that have better and/or more abundant agricultural

natural resources and a national economic organization that defines a more favorable environment for agricultural production.

These particular conditions have resulted in that agriculture receives governmental support in the majority of countries through tariff protection, price support policies and subsidies, both direct to the producer, and through the provision of public goods.

A paradigmatic example of ample domestic support policies for agriculture, in the case of developed countries, is the PAC of the European Union, which has remained with some changes in the Farm to Fork proposal recently approved, but which is also present in other OECD countries (see Figure 3.8).

Figure 3.8 Support to Agricultural Production in Selected countries (OCDE)

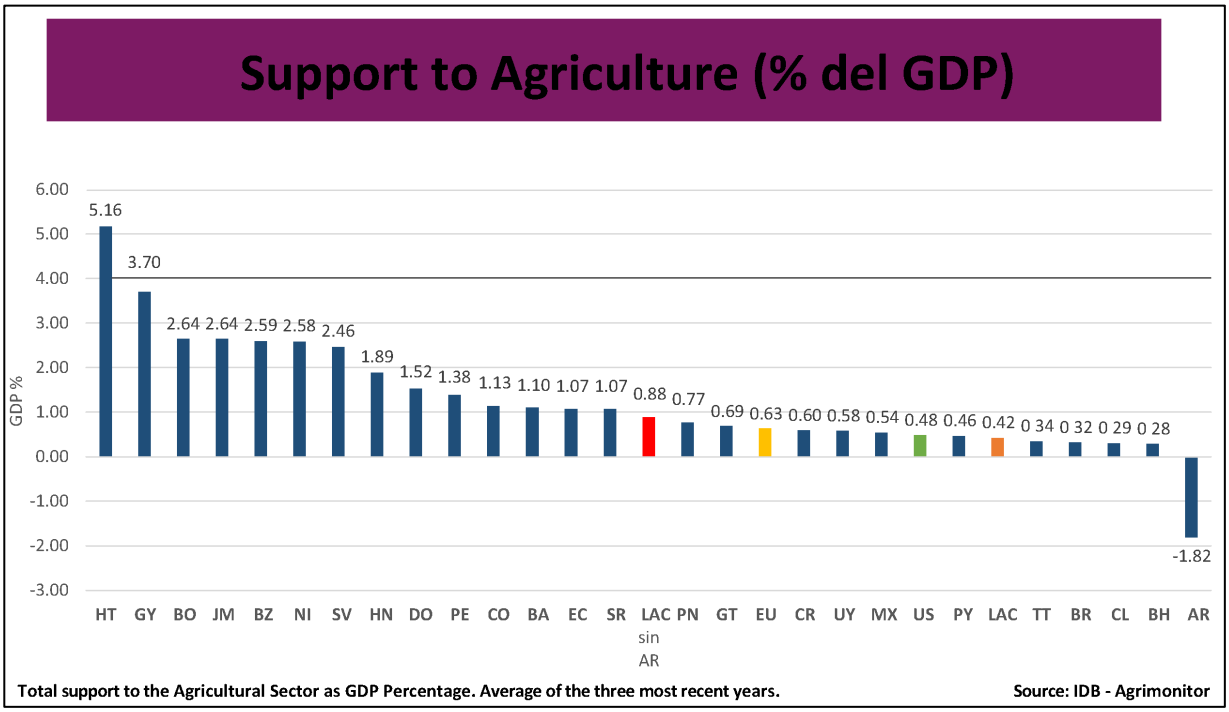


These policies expressly establish that one of the objectives is to insure an adequate retribution for agricultural producers. Another example is the agrarian policy in Japan, which includes very high tariff protection mechanisms and huge direct subsidies to agriculture to allow for the subsistence of producers that are not competitive at the international level.

These policies also exist in many developing countries who, in many cases, have a narrower objective focalized in economically sustaining small producers that represent an important proportion of the population, both rural and national, and that are not competitive at the international level. This situation is especially relevant in some Asian countries such as India or Bangladesh where the small agricultural producers and the rural population in general, represent a very high percentage of the total population. In this way, although agricultural activities provide insufficient income to producers, the lack of opportunities in other sectors of the economy makes it necessary for them to remain in the countryside both from a personal standpoint and from that of society and the government as a whole. These structural conditions justify the important support policies for agriculture implemented in such countries. However, in a long-term approach, this situation should be viewed as a structural problem that must be gradually solved through a more diversified and inclusive economic development.

In Latin America, these extreme situations are found in just a few countries and in particular situations. However, as it can be seen in Figure 3.9, almost all the countries in Latin America and the Caribbean have agriculture support policies, in some cases, quite significant.

Figure 3.9 Supports to agricultural production in countries in Latin American and the Caribbean



Thus, as can be seen in Figures 3.8 and 3.9, domestic support policies are quite generalized around the world and their implementation is justified by a combination of the following three development objectives:

a) Supporting small scale farmers that have little systemic competitiveness. This justification is widely used in developing countries;

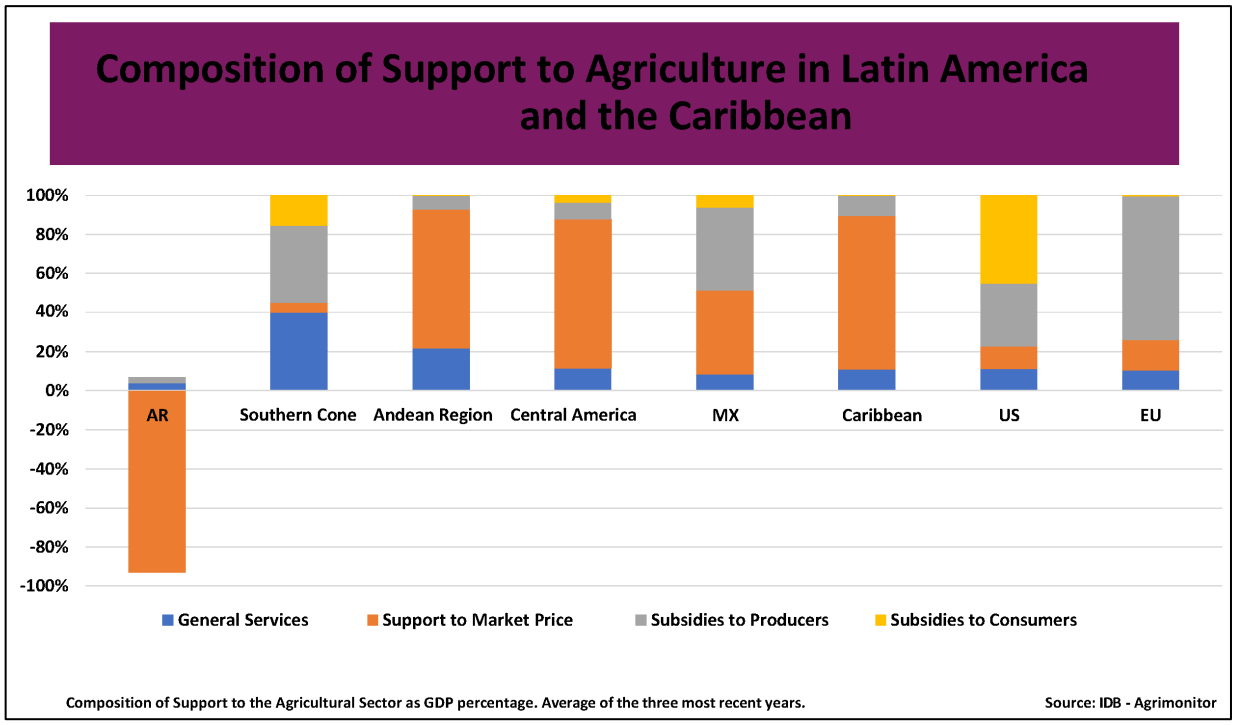
b) Making up for the positive externalities of agriculture that are not compensated by the market (conservation of culture and landscape, protection of the natural resources, etc.) that is one of the traditional arguments used by the EU to subsidize their agriculture; and

c) Protecting national producers from international competition of productions that have negative externalities with global negative effects that are not

included in the price of agricultural commodities. This is the main argument put forward by the EU in the Farm to Fork to set a border price to productions that are not carbon neutral

In Latin America support programs for small producers have used tariff protection measures and direct price support mechanisms as the main instruments. The empirical evidence indicates that support prices benefit each individual producer in proportion to their production and, therefore, they are more significant for commercial agriculture that produces at a great scale. (See Figure 3.10)

Figure 3.10



Therefore, price support policies (subsidies) to agriculture, which have been mainly justified for supporting small producers, have not met such objective for three main reasons. **First**, because price support policies used have benefited production and

agricultural producers regardless of their size or productive and economic conditions or of the positive and negative externalities of their productive systems. **Second**, because the different types of small producers have not been clearly defined or identified. Even if there are many who have feasible and reasonably productive farms, that could be developed and become viable agricultural enterprises with appropriate public policies, there are many others that, due to their productive conditions, cannot take advantage of the support they receive. A farmer who does not have sufficient land and who also has low access to information, to strategic inputs and to the market, cannot take advantage of the price subsidies or other support mechanisms provided throughout the market.

These farmers, many of which are rural inhabitants with some subsistence agricultural activities and who generate income in other non-agricultural activities, require support through direct cash transfers and appropriate provision of public goods, such as education and health, similar to those received by urban inhabitants.

Another negative consequence of the application of these price support policies to agriculture is that they have contributed to preserve less productive agricultures, have delayed technological innovation and have hindered agricultural trade liberalization at a global level. From a national perspective, they have hindered the efficient use of scarce agricultural natural resources, the increase of production and productivity of agriculture and, consequently, this has resulted in lower production and higher food prices ar national and global levels

Food production inefficiencies at a national level have also had negative impacts at a global level. World consumers pay higher prices for food than what they would pay if all countries, and therefore the global food system, worked under more

competitive rules and kept higher standards of efficiency and productivity. In a certain way, it can be said that tariff protection mechanisms and price subsidies have resulted in global consumers, the majority of which are urban poor, subsidize rural poor and, in many cases, agricultural producers which, in general, are not poor.

This analysis is not a negative value judgement in regards to agricultural policies which are widely used. Certainly, in many countries of the world, like India for example, macroeconomic and population conditions probably make it impossible to modify the current situation in the short run. It simply points out and emphasizes that the agrarian policies implemented in many countries constitute an issue that deserves deep consideration because of their negative impact on global food production and international food prices.

From a global perspective the development of the global food system should have, as its main objective, nurturing a growing world population in a sustainable manner and at reasonable prices. For this public policies should be focused on building a global food system that uses the scarce natural agricultural resources of the world with the utmost efficiency and productivity and that also includes a correct attention to the attributes of environmental sustainability, and health and nutritional attributes that have been developed in prior sections. This view, which is included in the SDGs, suggests that developed countries should collaborate with the developing countries to adapt their national food systems to achieve efficient and sustainable production systems worldwide.

At a national level, when the productive conditions make it necessary, the response to rural poverty issues should be focused on social protection policies, appropriate

access to public services and developing capacities for alternative employment. These policies are of a national scope and would not affect either the international food prices or the amounts produced and offered at a global level. In this manner, rural poverty which is a national problem, could be resolved through national policies wich do not affect the global food system.

6. SOME GENERAL CONCLUSIONS

In previous sections, it has been proposed that a core challenge ahead is to develop a global food system that includes the five necessary dimensions/attributes in a simultaneous and balanced manner in order to harmonize, in each national food system and at the global level, the trade-offs that exist between such dimensions/attributes.

The possible discrepancies that may exist in regards the conformation of the global food system arise from the importance that each person o stakeholder assigns to each of the five dimensions/attributes. Some will assign more importance to food security while others to environmental sustainability and so on in regards the five attributes. It is also true that assigning an exaggerated or exclusive importance to any of the attributes may result in a non-viable global food system that does not meet the objectives contemplated in the Development Goals of the United Nations. This would have very negative consequences for humanity.

The future development of the global food system will depend both on the proper understanding of the problem, on the part of society as a whole, and on the organization of the necessary political and negotiation processes. The observations

and proposal made in this document aim at contributing to a better understanding of the topics inherent to the development of an efficient and balanced global food system.

On the other hand, the political negotiations and the definition and implementation of the policies necessary to develop an effective and balanced food system will require institutional mechanisms that promote and facilitate such negotiations, both at the national and multilateral levels. These topics will be considered in chapters IV and V, respectively.

CHAPTER IV

NATIONAL FOOD SYSTEMS IN LATIN AMERICA: INSTITUTIONAL ORGANIZATION AND PUBLIC POLICIES

1. Introduction

The definition and conceptual description of "food systems" has already been covered in Chapter I with special reference to the global food system. This Chapter analyzes certain peculiarities of national food systems in Latin America, including the current institutional organization that prevails in the Region. This analysis will provide the necessary descriptive background and then will propose the core elements of the "needed institutionality".

To such end, it is useful to follow a line of thought that includes the following steps: (i) present the concept of food system, its evolution and the factors that determine it; (ii) review the "players map" that take part in the national food systems of the Region (economic and productive players as well as institutional ones) and finally (iii) present a set of simple and pragmatically proposals, to improve the institutional mechanisms necessary for a better governance of national food systems in the Region

Which are the features that define a "Food System"? In order for a system to exist, there must be *"a set of elements related between them that orderly contribute to a certain objective"* or *"a set of rules or principles, rationally interlinked"* (RAE Dictionary). Both definitions illustrate very well the linkages and interdependence

between the productive, economic, financial and commercial players that compose what today is identified as a food system.

In order that food production, industrialization, commerce and distribution operate as a system which contributes to a **common objective,** it is necessary that the diverse economic players and processes including people, productive units, organizations, and companies are coordinated and organized all along the production process to the point where food gets to the consumers table.That being the case, the development of any part of the system will have repercussions and impacts on the whole.

Another question that needs to be highlighted is the ***eminently evolutionary nature*** of the definition and concept of a food system. The definition that characterize and facilitates understanding of the existing food systems in the region in 2021 will certainly not be the same in 2050. A dynamic interpretation of the food system concept is necessary because the strong impact of new technologies in the fields of the digitalization, information, telecommunications, and the "internet of things" has on the economic and social development.

In Chapter I, it was argued that the complex global food system is integrated by private firms, groups of private firms, associations and ***"value chains"*** that have a considerable level of independence from the public sector because there is no effective global governance structure. On the contrary, at the national food systems level, the set of economic and productive players are articulated within a common governance system, agreed, accepted, respected and regulated through contracts and agreements that are legally valid.

2. National Food Systems

The ***"national food systems"*** are national because they produce, commercialize and distribute food within the same country. However, they are not autarchic or closed and the particular conditions of the territory, region and country in which they operate, and even the world, impact on the way they produce and function. To a larger or lesser extent, all national food systems are interrelated by the economic, financial, technological, information and commercial links existing among all of them.

In Latin America, the economies are increasingly more open, in economic and commercial aspects, although certain regressive trends have emerged during the past decade. In spite of that, the performance of agricultural, agro-industrial and commercial activities, related to food production, show today higher degrees of interdependence in terms of access to global goods and services.

On the other hand and given the importance that agro-industrial exports have in the region, their national food systems are also affected by decisions that are taken beyond the borders of the country in which they are located and where they carry out their production and trading functions.

This interdependence with the rest of the world is strengthened because science and technology are ***a global domain*** that influences the performance of key sectors in the economy, such as finance and capital flows, logistics, transport, telecommunications, biotechnology and consumer behavior. As a consequence of this, the markets and the traditional comparative and competitive advantages of companies, societies and countries, are changing at a very rapid pace.

The national “food systems” are built from the social, economic and productive relationships between agricultural production units themselves (taking this term in the broadest and most inclusive sense) and corporate, commercial, industrial players and a group of varied services, that are beyond agriculture. As it was clearly pointed out in Chapter I, these social relationships ***are built starting from the rural territories***, where agricultural production units are located and influenced by the agro-ecologic, economic, social and institutional conditions of such territories.

In Latin America and the Caribbean, composed of four very heterogeneous sub-regions both within and among them, the national food systems, and specially the local food systems, are based in specific rural territories that have different historical cultural conditions, and varied endowments in relation to investments, human and social capital and agro-ecologic conditions. Within each of these sociocultural and economic environments, there are production systems and economic and commercial relationships to produce the foods that the local population requires and those that, given their natural resources and climate conditions, may be produced with sufficient comparative advantages to to compete in the international market.

On the other hand, it is important to emphasize that LAC has, even today, very isolated territories that have recurrent climatic stresses and lack transport and communications infrastructure. These conditions are particularly frequent in Mexico, Central America, Colombia, Peru, Bolivia and Brazil. This isolation limits the integration of these regions to the national food system and worsens the high levels of poverty and indigence of those rural communities.

The national food systems of Latin America have changed in the last 30 years adjusting both to international and national changes. These processes included the globalization of consumption patterns, the development of telecommunications (that had large investments during the 90,'s and then with more emphasis between the years 2004 and 2016), transport and logistics infrastructure and connectivity and data transmission capacities. In addition the social policies that significantly improved the income redistribution in most Latin American countries were particularly important.

A consequence of these processes was that, except for very isolated territories, the food systems became interconnected and the food accessible to local consumers is not only the local or "autochthonous" produced in the locality in which they live. Food supplies where complemented with more varied products with a higher degree of processing, industrialization and added value coming from other regions of the country and the world.

3. The food systems in the Region: The factors (drivers) that determine the transformation and institutional peculiarities in Latin America

The evolution and current composition of food systems in Latin American countries have been determined by the same drivers and dynamics that where conceptually developed in Chapter 1. However, the Region has had its own peculiarities that differentially affected the evolution of their food systems. These differences are especially important regarding the evolution of public institutions related to food systems in the countries of the Region. Consequently, these differences mut be taken into consideration in the selection of the guiding principles that should be

used to implement an institutional reform with the objective of strengthening the capacity to design and implement the food policies necessary now and in the future.

3.1. Globalization and its impacts in Latin America.

The evolution of political priorities at an international level: *From Breton Woods to the SDG of the 2030 agenda*

As regards geopolitics and the international order, there have been successive and deep transformations in the past 50 years (1970 – 2019) Within the umbrella of the institutionality created in Breton Woods and a growing influence of the United Nations system important advances has been made in human development and the prevention of conflicts and humanitarian catastrophes. This positive scenario has been debilitated by the emerging reality of an unusual and sustained frequency of environmental catastrophes and the consequent appearance of environmental risks and climate change and their impact on human development.

The Sustainable Development Goals (SDG), approved by the General Assembly of the United Nations in 2015 and the 2030 agenda, beyond the diplomatic and political rhetoric, has influenced the international public opinion. The broad dissemination of the objectives and goals proposed by the United Nations through the media, social networks, and civil society organizations in each country had a high degree of incidence in public opinion and induced governments to adopt significant commitments. These governmental commitments must respond both to the social demands of the local communities and to the trends and opinions of the international community.

Multilateralism – Open Regionalism, boom and decadence

Since the 90's and up to the middle of the last decade, trends in international agricultural trade fluctuated between: (a) an affirmation of multilateralism and a progressive liberalization of agricultural trade, which followed the general trade regulations applied to goods and services, according to the rules of the WTO; (b) protectionist trends; and (c) an "open regionalism" characterized by commercial agreement between blocks.

Within this complex multilateral framework, in early 2000 China emerges as a political and commercial disruptive force that, in a broader sense, generates a new geopolitical framework characterized by a bipolar world, still in construction, and a weakened multilateralism.

This results in an overall commercial policy, less ideological and based on competition and commercial confrontation that is expressed in the messages issued by Trump's United States[102], or the China of Xi Jinping as well as in the modernized agricultural policies of the UE. These new policies have a strong orientation towards a clean production, rural development and more direct links between production and consumption, betting on stimulating food and nutritional safety based on "healthy diets".

These developments have a strong influence on the multinational agro-food companies and the strategies followed by exporting countries in relation to the global food trade. The new trade environment increases the differences between those exporting countries that still face tariff barriers to access main markets, and

[102] A la fecha con Joe Biden, ya presidente de los Estados Unidos, nada indica aún, que la tendencia en este aspecto vaya a cambiar demasiado, más allá de una posible morigeración en las relaciones entre USA y la RP de China. De hecho, en su discurso inaugural del 20 de enero el presidente Biden, poco o nada dijo al respecto de recuperar desde los Estados Unidos el liderazgo en cuanto a impulsar el multilateralismo y la liberalización sostenida del comercio. OJO

other countries that have been able to sign satisfactory commercial agreements, mainly with the big agricultural importers such as United States, China, the European Union, Japan, and South Korea, among others.

3.2. Urbanization as a guiding factor for public policies

During the past two decades, urbanization has emerged as a process that slowly but consistently, especially in the LAC and also in other less developed regions in the world, impacts on the organization of societies and of nations.

Concurrently, social inequality and poverty concentrated in the resulting big urban conglomerates. Consequently the focus of public policies for human and social development, instrumented by the governments, was on urban zones, displacing the concern and attention on rural issues.

This is especially evident in relation to the “macro” impact of rural-urban migration and the behavior of individual, family and communities in Latin America. Among the 40 most populated cities in the world, with populations near or above ten million inhabitants, Latin America has Mexico City (20.1 M), Sao Paulo (19.7 M), Buenos Aires (13.6 M), Rio of Janeiro (11,8 M), Lima (9.6 M) and Bogota (7.4 M). These big megalopolis, a term that implies including the population who lives in the city itself -area or administrative district, plus their areas of influence – have changed the focus of public concerns and the political attention of governments. Main concerns have been the development of guidelines and rules for peaceful coexistence, public safety, investment in sanitation, infrastructure, transport, communications, services and public assets both referred to citizen safety and health and education.

Thus public policies in Latin America – as in other regions in the world – changed its focus and the assignment of resources from rural territories towards urban ones.

3.3. Food systems: Public purchases

The growth of urban duelers transformed the organization and operation of food systems. With increasing intensity, it becomes necessary to feed millions of people every day, feeding them with safe food and with a healthy and varied diet. This problem was aggravated because urban concentrations have, in the region, the highest concentration of poor and marginalized population. Social protection including those related to food security demand that governments and local entities organize mechanisms for public purchase, distribution and facilitation of food in order to improve its access by the poor. These programs include distribution of food, and "financial inclusion" that facilitates access to food through "loans" and "rights" (transferred with vouchers, food coupons, debit and/or consumption card) that the government grants to poor and/o marginalized population

These programs requiere different types of food supply agreements and contracts between the main operators of the national and/or international food systems with the government entities in charge of the food security programs.

These food suppliers must be reliable, as regards the conditions of delivery and distribution, including timeliness, opportunity, adequate prices, quality and safety of foods. They must have storage capacities to stock before distributing, and sufficiently powerful and streamlined logistic systems, including cold chains, so as to meet the conditions established in the agreements with the State. They must

also have a significant financial capacity, as the State is a good payer, but may pospone payments.

In addition, the food systems - the set of productive, commercial and industrial agents that participate - are not of equal size, degree of complexity and specialization. Big differences exist between food supply programs in megapolis such as Mexico City, Caracas or Sao Paulo, and those in small cities, towns, or rural areas. The requirements and the suppliers are very different in these two cases. The smaller the urban concentration and the population to serve, the more opportunities for participation of local food systems composed of small and medium size companies, lesser scale farmers and the so-called “short-circuit supply chains”.

Specialized programs such as those implemented in schools, insuring a suplemetal and nutritional diet to millions of children in several countries of the Region, also have other requirements. Countries such as Brazil, Colombia, Mexico, Peru, Paraguay, Costa Rica and El Salvador, have decentralized the public purchase and supply processes from the ministries of social security and/or education to the local authorities or teaching centers themselves, benefiting local suppliers. This requires that local institutions both, private and public meet certain conditions: **(i)** a good accounting, administrative and financial system; **(ii)** adequate logistical equipment, including cold chains; **(iii)** are able to meet the demand of educational centers with locally produced supply and **(iv)** organize advisory programs for associations cooperatives and other organizations of small scale producers, including agroindustrial small and medium size companies, to operate as reliable local suppliers.

Notwithstanding these decentralization processes, government entities in charge of public purchases, public supply companies, the national and regional food programs have continued to depend for their puchases on big companies and national food producing conglomerates, in some cases subsidiaries of multinationals, as well as of the big distribuitors. These are the most relevant participants in food public purchase operations by governments, as they have all the required attributes.

This dependence of food programs on the big bidders for the supply of food explains, at least in part, the loss of relative importance of public policies, and investments in the rural areas and territories which has generated a set of negative effects in the development of the rural territories: **(a)** punishes local food systems affecting the productivity and competitiveness of farmers, specially of small farmers; **(b)** reduces investments in rural infrastructure, which raises the price of transport, logistics and supply process; and **(c)** in many cases, it makes the countries and communities more dependent on food produced outside their territories and even outside the country that must be imported.

3.4. The golden decade for agriculture

In 2000, international capital flows where strongly redirected towards investments in emerging economies. On the other hand, between 2003 and 2014, price increases in agricultural commodities grew at historical levels reverting the negative trends that had been dominant for decades. These two added phenomena generated a favorable environment which has been called “the golden decade for agriculture” during which there was an improvement in the economic performance

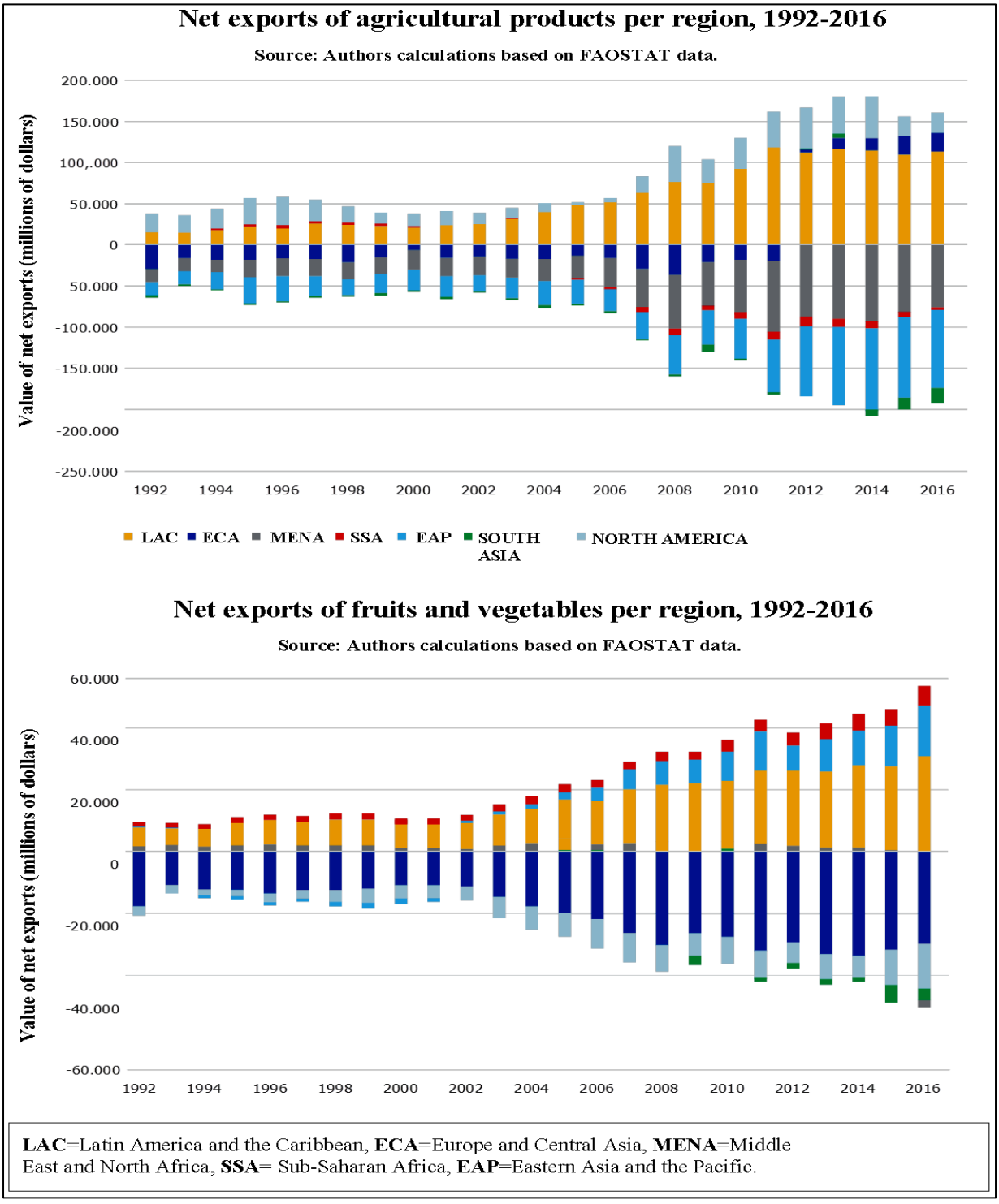
of most countries in the region that, except for Venezuela and partially Argentina, had a sustained and remarkable increase of the national GDP.

Most countries also made strategic investments for the benefit of their exporting sectors and, at the same time, applied social policies that led millions of people out of poverty. The “champion” in this “wise” combination of markets conditions and social policies was undoubtedly Brazil, between 2003 and 2014.

These processes also generated sustained increases in food demand, in the quality of diets and in strengthening an optimistic outlook for agriculture. These favorable conditions lasted until 2014/15, after which, capital flows and investments, as well as the price of agricultural commodities, had negative and very volatile trends, which have been common in the region.

Figure 4.1 clearly shows the rapid increase of exports until 2014 and the subsequent stagnation. This stagnation in the past years does not affect the important participation of the Region in the global food exports. LAC continues to contribute an enormous amount of food to global consumption, including fruits and vegetables, being the Region with the largest net food exports. (See Figure 4.1)

Figure 4.1



Source: World Bank. Morris, M et al PANORAMAS ALIMENTARIOS FUTUROS. Reimagining agriculture in Latin America 2020

Figure 4.1 shows that between 2003 and 2014 the region experienced an accelerated growth of production and exports that were a consequence of the better international economic context that allowed for investments in adapting and adopting new production technologies that increased the productivity and competitiveness of agricultural and cattle production systems. This expansion of production was especially noticeable in commercial agriculture including some cases of capitalized family agriculture, especially those that are effectively and efficiently inserted in the local, national and even global value chains. This situation has generated structural changes in most of the production systems which suggests that the Region will continue to be a key player in insuring global food security with low and stable prices.

These structural changes in production were strengthened by increases in the aggregate demand both from the international market and from internal demand. On the one hand, between 2004 and 2015, the international food demand grew for Latin America due to the demand pull by China and other Asian countries. On the other hand, the exit of millions of people from poverty as a consequence of a virtuous combination of income redistribution policies and formal employment, resulted in a decade of national GDP and food consumption increases

The impact of this expansion of aggregate demand, both international and national that took place between 2004 and 2015 created the conditions for a golden decade that meant a great opening of opportunities for agricultural producers in many countries of the Region. Many small and medium size producers (capitalized family farmers, semi-capitalized and in transition) had a clear and positive response to the

growing demand increasing productivity and food supplies. However, this phenomenon had unequal effects between countries according to whether they are net food exporters, net food importers or in an intermediate situation.

3.5.The impact of technology: The green revolution, agricultural production to feed the world

The green revolution is the name used internationally to describe the important increases of agricultural productivity and food supply that occurred between 1960 and 1980 in the United States and further developed and disseminated by the CGIAR to numerous countries in Latin America. This technological revolution defined the global behavior of production and food supply, and consequently, of food markets.

The green revolution was motivated by the need to insure the capacity to feed a growing global population, especially in those regions of the world that emerging after the post-war and decolonization processes. It was based on scientific research applied to agriculture, and the coordinated application of technical assistance and the adoption of new organizational models for agricultural production which were more efficient in the use of natural resources. It also resulted in a higher utilization of agricultural inputs and indirectly in equipment and services.

Latin America was one of the regions in the world that benefited the most from the results of such technological advances. Significant yield increases, better plant varieties more adapted to the availability of water, gradients of temperature, resistance to plagues and diseases, and grains with higher qualitative attributes for industrialized food products where obtained in a number of crops such as wheat,

corn, rice, barley, sunflower, soybean and sorghum and in others, very typical in the region such as coffee or sugar cane. Tubers such as potato, or citric fruits were also benefited. In animal production, there where advances in the production of milk, beef and poultry meat. All these technological advances supported the development of regional food systems and their growing competitiveness in international markets.

3.6. The Sciences and Technology Revolution – The era of knowledge

Progressively, applied Science and Technology expanded to other stages of production linked to the marketing and distribution of food. Between the 80's and 2000, changes occurred in processing and commercial systems and in consumption guidelines and models. The exports of gross raw materials, with low value added, from producing countries to consuming countries progressively incorporated new technologies that made possible the production and exports of locally processed foods.

In the past half century, much has changed as regards to food production, including the geographic location of production, commercial channels, relative comparative and competitive advantages of countries and regions, the construction of productive chains, the production and trade matrix, and finally food systems. These structural changes modified an agricultural production based on the endowment and combination of natural resources and climate organized arround small and medium sized productive units dispersed in rural territories, into corporate and business units increasingly bigger and more integrated, with significant investments in equipment, infrastructure and applied technology. These transformations

occurred at a global level, but were particularly intense in many countries of Latin America.

The classic comparative and competitive advantages also changed generating new regions and territories that were able to competitively produce foods for the global market. The technological changes in transatlantic transport, mainly the combination of vessels of increasingly bigger sizes and the more effective management of containers, lowered the costs and reduced losses and time which made long distance trade increasingly feasible.

Later, the science and technology revolution started in the 90´s, made possible new techniques such as genetic engineering, internal and in-depth study of cells, and the study of DNA, allowed for the creation of a new generation of agricultural products, adapted to geographic sites and on soils where it was not possible before. The natural comparative advantages definitely lost importance and the construction of competitive advantages became decisive.

The six most influential factors related to technology in food systems of Latin America

Even if technological development was broad and inclusive covering different aspects of the productive system, there are six areas of innovation that have been especially important in Latin America.

- **Biotechnology**, that allowed for a reconstruction of the new competitive and comparative advantages based on the genetic improvement of species
- **Connectivity and telecommunications** that facilitated business operations, through information and communication services

- **IT and digitalization** that contributed to a higher effectiveness and efficiency in the production and commercialization of food products including traceability systems
- The development of **transport and logistics** (containers, multi-mode transport systems) with the consequent reduction in costs and time for long- distance international trade
- **The consolidation of modern markets**, which operate without mobilization of physical goods and, consequently, the multiplication of business opportunities
- **The bio-economy and circular economy**, facilitated by new technologies, which are essential to reduce environmental pollution and to make the local and national economies more efficient

These 6 factors or trends in technological development modified the behavior of companies and of national economies and were responsible for the blurring of borders between the traditional sectors of the economy: the primary sector (agricultural), the secondary sector (industrialization) and the third sector (services) and also between the companies in each sector which led to complex commercial strategies and "integrated systems" which characterize the modern food systems.

These transformations in the productive sector also derived in changes in consumption habits and diets and increased the proximity between the producers and consumers based on the compliance with regulations, standards and a wider transparency in production processes

3.7. International trade governance – "deregulation of regulations"

The transformation of the productive structure was accompanied by a progressive liberalization of agricultural trade, aligning this strategic sector for many countries

in the Region, to the rules and trends generated initially by the GATT, in the Uruguay Round (1986 – 1994) and in the successive rounds that took place after the creation of the WTO in 1995.

The Uruguay Round of GATT changed the rules of the game in agricultural trade. Although many countries consider that the scope of the agreements reached where modest, and that many of the agreements have been mostly breached, the Uruguay Round generated a "universal awareness" in regards to the need of feeding the global population, with effective, competitive and sustainable agricultural practices. In order to reach this objective countries had to observe a set of standards and commitments accepted by all players in the global agricultural trade. It lasted seven years and a half, twice the foreseen time and towards the end of the process, 123 countries were participating. It was the biggest trade negotiation that ever existed in the history of humankind and resulted in the biggest reform of the global trade system.

During these years multilateralism was seen as the most effective way to organize and rule international trade as a way to promote economic growth and a better use of global resources. However, concurrently an "open regionalism" consolidated, through agreements that consolidated economic-commercial blocks between countries to facilitate, economic integration, regional trade and the development of countries that belonged to the same geopolitical region and also between regions. The most significant commercial blocks created during those initial years were the EU, MERCOSUR, EFTA and FTAA, among others.

During the initial negotiations of the GATT Uruguay Round and even after the creation of the WTO, the most important food exporting countries in Latin America

negotiated as a group the liberalization of agricultural trade. They also joined efforts with other important food exporting countries such as Australia, New Zealand and Canada integrating the so-called "Cairns Group"[103], which had significant achievements in advancing new rules for agricultural trade. The group, with significant participation of Latin American countries, was instrumental in promoting food production and trade and the modification of trade distorting policies defended by countries and blocks such as the EU, India, Japan and Korea.

3.8. The voice of consumers

The set of drivers described in previous sections plus the rapid expansion of food consumption and demand from developing countries and changes in consumption patterns resulted, not only in the expansion of global food demand but also in the modification of the structure and functioning of food systems.

The generalization of a "global culture" linked to new food consumption habits and a higher impact of "the voice of consumers", expressed directly in the markets resulted in that the traditional "agro-centric" view evolved to a new "consumption-centric" view. Consumers became the center of the food system with a larger capacity to drive the market and, consequently, the productive system. That is to say, the end product, its qualities and attributes and the way in which they reach the consumers' table, according to their demands, guide the business plans of the global agricultural chains. Even if this trend can be considered global, the way they are expressed in the different regions, also adjusts to the peculiarities of local consumer demands. These are highly influenced by the culture, the traditions and

[103] ***Argentina***, Australia, ***Brasil***, Canadá, ***Chile***, ***Colombia***, ***Costa Rica***, Filipinas, ***Guatemala***, Indonesia, Malasia, Nueva Zelanda, Pakistán, ***Paraguay***, ***Perú***, Sudáfrica, Tailandia, ***Uruguay*** and Vietnam

the history of each region. However, in recent times, they show some degree of cultural “hybridization”, combining local or native foods, which respond to the tastes of local consumers, with foods, specially processed food, coming from global consumption trends. In many countries of Latin America and the Caribbean ultra-processed foods (fast food, snacks, refreshment meals for children and youths) are prepared using local raw materials with long cultural tradition, but prepared and presented in accordance to global consumption guidelines. This shows that although local consumption traditions continue to be strong their food demands are served not only by the local agricultural and agro-industrial production, but also by the global food chains.

This description shows the strong interconnection that exists between the local, national, regional and global food systems and how their business strategies blend multiple capacities, interests and knowledge, in the broadest sense of the concept, which are increasingly wider and more varied. It also shows that the success of food companies and of the local food systems is based on listening to consumer’s voice.

In order to participate and contribute in these processes with “wisdom” and effectiveness, the public sector requires the similar capacities to understand the way food systems work and implement regulations that represent the wider social interest which are represented by the consumers in their role as citizens.

3.9. Environmental sustainability: The demands of the international community

As described in Chapters I and III, environmental sustainability is one of the main concerns of the international community which is reflected in the media, social networks, civil society organizations, public opinion and private sector companies of most sectors of the economy. The United Nations and its multiple agencies have been the champions in drawing attention to deforestation, desertification, irreversible erosion of soil, pollution of waters and oceans, irreversible loss of species and biodiversity, ecological imbalances and the diffusion of plagues and diseases, including the emergence of new ones, beyond their historical areas of occurrence. Moreover, global warming, generated by greenhouse gas emissions threatens the quality of human life and, eventually, its survival.

This situation has highlighted the growing difficulty to feed an increasing global population, concentrated in big cities and, at the same time, to preserve the ecosystems and reduce the greenhouse gas emissions. These two objectives must be met simultaneously at a regional and global level. In this task, consumers are key actors because, through the selection of the food they consume, they provide information on their preferences in regards to these competing objectives

For Latin America and its food systems, this is a particularly critical “driver”. Latin America is one of the main reserves of, native forests, biosphere and fresh water in the planet and also, one of the most important regions in international food trade. The Region must blend this double global responsibility of contributing to feed the world while paying attention to environmental concerns. Consequently, the

environmental sustainability of food systems has to be one of the critical areas in the design of public policies

3.10. The concept of One Health (one global health): the teachings of COVID-19 pandemic

The economic consequences of the pandemic in the region are especially severe. Latin America will have a contraction of its economy of almost 10% during 2020. That is to say, the region was 10% poorer, at the beginning 2021 and the shape of the recovery is still uncertain. The significant economic recovery during 2021 in most countries of the region and the aggressive vaccination programs applied in most countries, generate hope for a relatively rapid return to “normal” or pre-pandemic economic situation.

One of the impacts of the painful and traumatic experience of the pandemic generated by COVID-19 and the overlapping economic, financial, labor, social and educational crises has made evident the need to carefully study the interrelations between human, animal, plants and environmental health within the concept of “One Health”. This is particularly relevant in the context of the Regional food systems.

The concept of “one planet health”, is a mayor conditioning factor that needs to be incorporated in the production and distribution processes. It is a mayor responsibility for governments, civil society organizations and consumers and will certainly be translated into new trade regulations, to which countries will have to adapt and comply with. Compliance will be a new element that will determine the international competitiveness of the Region in food related trade.

4. Food systems and subsystems as a framework for the implementation of public policies

In Chapter I, the concept of a food system was described with its basic components and their existing interrelations. This analytic framework is also useful, for the identification and definition of the necessary public policies and for the analysis of the needed public sector organizations, which are the core topics in this Chapter.

The economic and productive trends described in previous sections were responsible for shaping the national food systems in Latin America. Each country had certain unique characteristics, especially in regards to the types of agrarian structures they had and their participation in the development of food systems.

The first element to point out is that in all local food systems and in the majority of the national food systems, the relative economic weight of agricultural production has decreased. However, in spite of this loss in relative economic importance, agricultural producers in charge of the primary phase of food production ***are a main component in food systems***.

Consumers participate in the food system in different forms and variable degrees of complexity. In one extreme, there are small family farms and/or the rural population at large which has access almost directly to what is produced in these family farms. Some products are consumed freshly and others are transformed (grass and grains in animal protein – meat, milk, eggs) and others partially processed and conserved. In the other extreme, a neighbor in Mexico city or the inhabitants of the peripheral areas of Rio de Janeiro or Sao Paulo or “La Matanza”

in the Metropolitan Area of Buenos Aires access food through highly concentrated urban markets.

Family farms are a very important component of food systems, as producers and also in their role as consumers, representing an important proportion of the total population that needs to be adequately fed. The majority of these producers, after meeting their own nutritional needs, sell their surplus in a regular and systematic manner, participating in local or regional markets. Some of them add to the family self-consumption products other crops or cattle production activities with the main purpose of generating the cash income which they need to purchase services (health, transport, education, recreation, etc.) and consumption goods that they do not produce themselves. In some cases they are bound by contracts with agro-industrial or commercial companies for the marketing of the surplus food they produce.

In addition to these family farms there are larger agricultural production units that are devoted to medium and big-scale commercial and industrial production and who operate fully integrated to diverse markets.

All of them coexist in the same rural spaces and territories and independently of the way in which they are classified in the socio-economic or cultural taxonomy, all of them are fundamental contributors to the food supply for the planet.

In Latin America, there are many different types of productive units. Whether they are family farmers, rural small and medium size companies, family companies, strongly capitalized commercial companies, or their conglomerates, all are part of the national food systems interconnected with the global food system and,

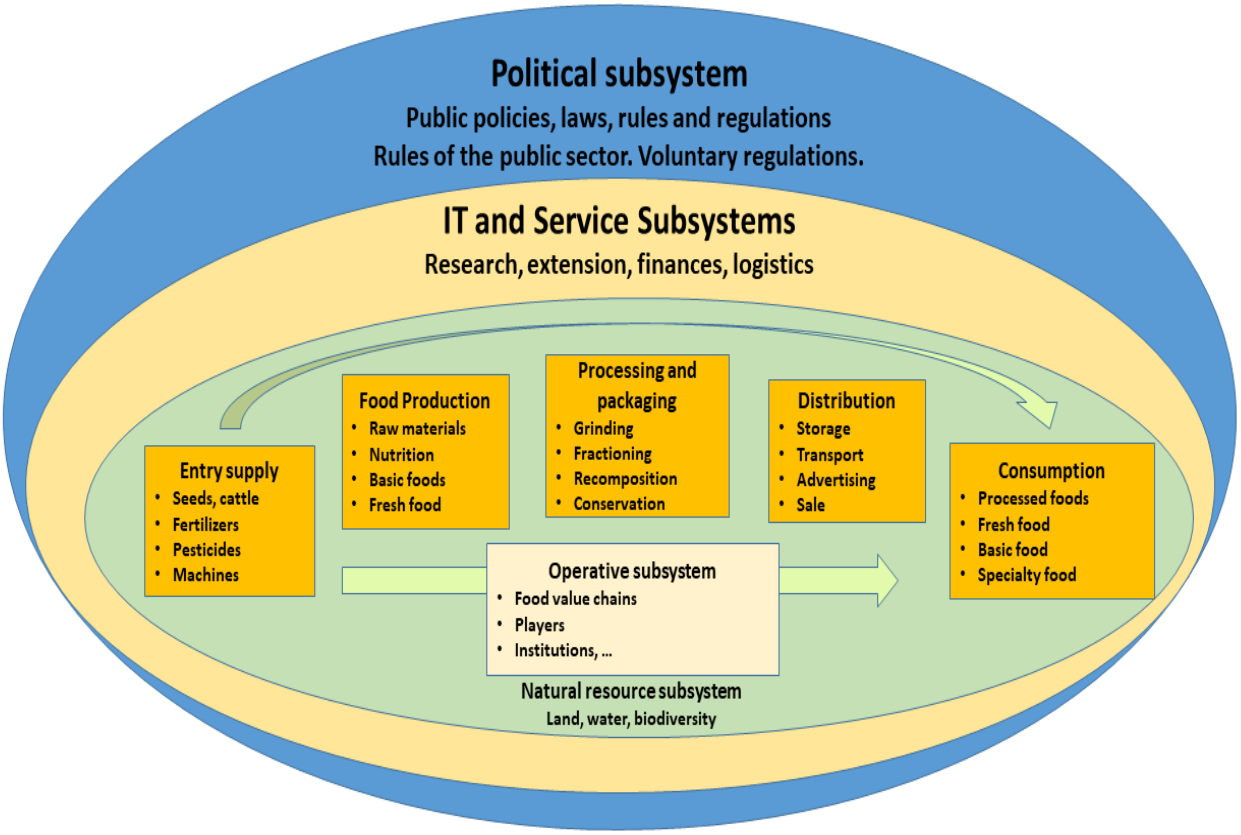
therefore, affected by the environmental, economic, commercial and technological global trends that occur in the world.

The productive chains are an important element of modern food systems. Through them, a vertical relationship is established between the different participants, including the agricultural productive units, the brokers and middlemen, etc. In most cases, all of them are interrelated through an organizing agent. However these food chains must not be seen as a linear structure but rather, as a matrix relationship, where horizontal relationships between participants are as important as the more classical vertical ones.

On the other hand, the concept of food system, integrated by a great number of productive chains, facilitates the understanding of transversal relationships and interactions that arise between different chains and their parts. These relationships are governed by the main objective of producing efficiently and according to the market demand. This is the objective that all participants must respect and to which they must contribute efficiently.

Figure 4.2 presents the main components of the system the different functions they perform, in an interrelated way, and oriented to satisfy the concrete demand which results from consumer preferences. The figure also highlights that the national food systems also respond to the existing public policies and to the legal and regulatory measures of the country they belong to.

Figure 4.2. The food system and its relationship with public policies



Source: Authors

patterns and to the new international regulations are possible reasons for this lack It can also be seen that in the national food systems, there are transversal and vertical business relationships through the local, regional, national and international value chains.

These analytical elements are useful to assess the different types of organizational frameworks that exist in Latin American food systems and to build a “map of institutional players”, that design and apply public policies related to the promotion, expansion, stimulus or regulation of national food systems

Latin America has the special characteristic of being one of the regions in the world with great food production capacity and with a very high participation in world agricultural trade. However, most of its exports continue to be, as they have been

historically, of agricultural raw materials or commodities, with relatively low added value through industrialization processes. The region also faces considerable challenges in relation to safety and quality standards and in the production of specialized foods aimed at niche markets such as, for example, nutraceutical foods with balanced components to improve the quality of the diet.

With some important exceptions, such as the production of vegetable oils, coffee, meat packing, some tropical fruits, flowers and a few other industries, the agro-industries in Latin America have not had a great economic and competitive performance at the international level. The relatively low investments and utilization of modern technological processes adapted to the new consumption patterns may explain this lack of dynamism, in spite of the extraordinary natural resources of the region. In recent years, big commercial chains and/or modern corporate groups have invested in several countries of the Region, absorbing the local agro-industry and integrating it with regional and global systems, a process that has begun to change this situation.

5. The role of the State, public policies and institutions

5.1. Existing policies and institutions: their weaknesses as regards the food system concept.

An assessment of the role of the Ministries of Agriculture in the Region suggests two main observations: a) the progressive loss of significance that the Ministries of

Agriculture have undergone for the last 30 years [104] and b) the dramatic changes they had, in terms of roles and functions, as a consequence of the Public Sector reforms arising from the "Washington Consensus" applied in LAC during the 80s and 90s.

During the period when the "import substitution" strategy was dominant in Latin America, the government was the main "commercial partner-advisor" for the agricultural private sector. Farm and business managers adjusted their business plans to the guidelines provided by the public sector in three main economic dimensions: (a) deciding "what and how" to produce based on the production and commercial indicators prepared each year, by powerful statistics and policy governmental offices; (b) producing for local markets which were protected through tariffs and other non-tariff measures that blocked any regional or international competition except for some products in which governments considered that imports where indispensable for feeding the local population and/or, to control inflation; and (c) receiving from the State loans and/or subsidies, technical assistance and insurance policies against climatic risks, plagues and diseases and for unexpected variations in the markets. The implementation of these policies and the predominance of a hyper-regulated agricultural trade, in some strategic products, needed influential, robust and technically competent ministries of agriculture.

These conditions where progressively modified as a consequence of the changes that occurred, both at a global level and in LAC, in regards to the predominant

[104] Martin Pineiro, editor. La institucionalidad agropecuaria en América Latina: Estado actual y nuevos desafíos FAO, 2009, 2) Pineiro, M et al. La Institucionalidad en el sector agropecuario de América Latina. BID 1999 y 3) Nores, G et al El sector publico agropecuario en argentina: reflexiones para su fortalecimiento. IICA 1996

economic strategies. The elimination of the import substitution strategy in most countries, the opening of the economies and partial deregulation of agricultural trade, the proliferation of bilateral and regional trade agreements, negatively affected the institutional, technical and political capacity of the ministries of agriculture. Most countries became exporting countries and the main objectives became lowering internal costs, eliminating bureaucracy and state interventions in the markets and generating new conditions for global competitiveness.

The progressive dismantling of the economic model and of the accompanying institutional organization was, in some places, slow and gradual and in others more accelerated. However, the dismantling was imperfect and unequal and in many countries residual mechanisms remained, with ambiguous functions and slow, complex and inefficient bureaucratic procedures. Instead of encouraging the development of a new and competitive agriculture it hindered it due to the lack of clarity in regards to the new “rules of the game”.

These changes in the economic context, the institutional reforms and the role of the state and the new economic and business context where reinforced by the impact of science and technology. Technological development occurred in agriculture and also in other activities somewhat related to it and it contributed to the loss of the relative power of the ministries of agriculture, specially in relation to budgetary negotiations, which affected their possibilities to initiate a technical and management modernization.

In the XXI Century, Latin America has Ministries of Agriculture with little capacity to regulate markets or provide economic incentives for agricultural production. The legal framework under which they operate, in many cases with shared

responsibilities with other institutions, are insufficient for the promotion and regulation of food systems.

Based on this situation, the performance of the ministries of agriculture in the region was limited with vested functions and powers that are either obsolete or go well beyond their possibilities and operation capacities. They are entities with a heavy regulating mandate, but without the needed capacities to effectively execute the regulations.

This has led to imperfect institutional reforms, for example, substituting the existing inefficient and ineffective executing units with projects funded through international cooperation. It has also led to the creation by law of decentralized governmental entities with a mandate of being instruments of the ministerial policy, but that in fact, given their high political representation and bulky budgets, have more powerful mandates and possibilities to implement programs and projects than the ministries themselves.

Additionally, functions and activities were formally decentralized, but the decision-making mechanisms were not. Consequently, the gap between the generation of policies in the national capitals and their execution in the territories, in relatively distant localities, departments, province and/or states worsened.

This process created a growing misalignment between existing public institutions and the expanding food system, integrated by multiple private players, with new dynamics and increasingly more demanding in terms of operating rules that are clear and sustained in time.

To summarize, it is possible to say that, as regards the governance of the national food system, the loss of relative importance of the ministries of agriculture in many countries of Latin America responds to some of the following factors:

- Their misalignment with the needs of the national food system, especially in relation to important dimensions: the preservation of the environment and regulating the food industrial processes. The sectorial agricultural policy became insufficient to incorporate the technological, commercial and environmental processes that go beyond the farms
- The progressive loss of their institutional, technical and political capacities and consequent an erosion of their capacity to have impact in the productive system
- Decentralization of important competencies to entities that, even if legally under the scope of the ministries of agriculture in technical and political matters, have a level of political autonomy, technical capacities and budgets that make it difficult for the ministries to exercise control.
- Progressive loss of budgetary and financial resources. (Less relative weight in the national budgets), deriving in a lower capacity to impact in political and strategic areas related to the economic development of the countries.

5.2. Public policies that affect national food systems. The role of Ministries of Agriculture

One important consequence of the deep transformations and growing complexity of local and national food systems is that they require broader and more complex public policies than in the past. Furthermore many of the public policies that are necessary for the proper operation of food systems do not depend, or are outside the scope, of the Ministries of Agriculture.

As a consequence two specific themes need to be analyzed. First, which are the functions and competences that the Ministries of Agriculture should have, as their own, in this new context and the capacity they need to carry them out? Second, which other public entities have a direct and important relationship with food systems and should be allies or partners of the Ministries of Agriculture in the governance of the national food system?

Regarding the first theme, the ministries have important competencies in the implementation of policies for the development of modern and competitive food systems, but in almost all cases, they require the cooperation of other governmental entities. Therefore, the answer to the first question is that ministries are necessary, although not sufficient, and they continue to have great importance.

On the other hand, in order to be able to fulfil the new functions, most ministries of agriculture in the region will require adjustments in their charters and the modernization of structures and capacities to generate both public–public and public–private alliances, to fulfill their mandates and responsibilities. To achieve this, the strengthening of their technical and budgetary capacities is critical to allow

them to be proactive in the formulation and implementation of policies that may strengthen the national food systems.

As regards the second theme, it is evident that the most important changes in the operation of the public sector are to achieve a stronger cooperation between the different ministries that have influence on the national food system. In this sense, a key point is that the ministries of agriculture should have the legal and operative capacity to participate, in cooperation with other ministries or government entities, in the six main areas of state intervention, that are described below.

5.2.1. Development of rural territories

The rural territories are the location of agricultural productive units and the private sector companies in charge of adding value through conditioning, conservation and/or industrialization processes of crop and livestock products. The Ministries that have activities in the territories with a certain order of priority are:

- Ministries or secretariats with responsibilities in the organization of rural territories
- Ministries or secretariats with responsibilities for planning investments in infrastructure and the supply of goods and public services
- Ministries of public works
- Ministries of environment
- Ministries of agriculture
- Provincial, state or regional departmental governments (2nd level)
- local, municipal, town governments (3rd level)

The interventions of the ministries and local government entities have a direct impact on how productive units linked to the food systems, especially the crop and livestock productive units, resolve the following set of questions:

- Access to production factors and public goods
- Land policies which define access and possession of agricultural land
- Water management policies
- Infrastructure networks
- Access to information and technologies

5.2.2. Public investment

Public investment, both with national or foreign resources, is key for the physical, economic and human development of the territories and food systems including its role as an incentive to private investment. In this case, the main entities responsible for public investment policies are:

- Ministries of Public Works
- Ministries and/or Secretariats of Planning
- Ministries of Education
- Autonomous and/or decentralized Public Companies
- National and/or regional Public Universities
- 2nd and 3rd level of State entities
- Ministries of Agriculture (to a lesser extent)

In this case, the main investment areas are:

- Road infrastructure (routes, rural roads, bridges, sewers, other works that facilitate the transport of agricultural production
- Logistics infrastructure. Intermediate collection, conditioning and conservation points
- Electrification infrastructure – generation and distribution including local generating units
- Telecommunications infrastructure
- Investment in public goods, including technological developments in the processing activities
- Investment in education including specialized technical training
- Investment in basic education HASTA AQUI

5.2.3. Improving institutional capacities at national level and in rural territories

Good public institutions are of particular importance to promote efficiency, effectiveness, and systemic productivity of all economic participants in local food systems. It is very difficult for individual companies to develop their full productive and competitive potential in unfavorable political and/or economic environments.

Local food systems include agricultural and non-agricultural activities. The latter are important and contribute with a sizeable part of total value added. However, it is important to stress that “everything starts” with agricultural production in the rural territories. The agricultural productive units that generate the goods to be sold and consumed are installed there. In depressed rural territories, with insufficient human resources, social capital, infrastructure and limited supply of public services, it is not possible to achieve the development of integrated and inclusive food systems that give back to the rural communities the benefits they generate in terms of

income, employment and services. In addition, it is also necessary to generate appropriate conditions for food related commercial activities that invest in the territories and must be able to attain adequate profits able to the general economy parameters.

To achieve these objectives Government institutions have responsibilities in the following main areas:

- Development of human resources
- Access to modern and efficient equipment
- Providing a secure legal framework
- Promoting the construction of social capital, based on inclusion and integration policies
- Fight against corruption
- Promote an appropriate business and investment environment

5.2.4. Macroeconomic and trade policies

As regards to ***trade policies***, it is necessary to recognize the structural differences existing in the different sub-regions of Latin America and the Caribbean. There are three main situations: a) countries that are net food exporters, mainly the countries in the Southern Cone, b) the broad group of countries that export and import in a balanced way, such as Colombia and Mexico, and c) the net importers represented by some countries in Central America and almost all in the Caribbean. Trade policies applied by all countries include agriculture as a specific sector subordinated to the more general interests of the economy as a whole. This is why agriculture has, in many cases, a secondary role in trade negotiations. However, its pre-eminence in

each country and the main objectives that are pursued differ depending to which of the three groups the country in question belongs. In this area, the Ministries of Agriculture have, or should have, a key role assisting, counselling and leading other Government entities in their areas of competence. The following entities intervene:

- Ministries of Foreign Affairs
- Ministries or Secretariats of Commerce/Foreign Trade
- Ministries of Economy
- Ministries of Agriculture

As regards ***macroeconomic policies,*** the situation is quite different. Economic stability, the predictability of economic policies, and the evolution of main economic variables are a set of general conditions which are necessary for the development, consolidation and good performance of the private sector including the national food system. Any unexpected variation in the exchange rate, in public indebtedness, or in the rate of inflation, dramatically changes the economic results of the agricultural sector and the related private sector companies that participate in food systems and, therefore, in the international competitiveness of food exports. Macroeconomic policies are much more important than most other policies and the responsibility is in the hands of the Ministries of Economy and Finance and, in some cases, the Treasury and the Central Bank. The issues listed below, which are not exhaustive, affect the business climate, international capital flows and investments and the performance of the food systems in the countries of the region.

- Balance of payments and tax policy
- Financial policy

- Foreign exchange policy. Relative exchange rate
- Policies to attract direct foreign investments

In this area, the role of ministries of agriculture is minor, and circumscribed to providing an honest and reliable analysis of the situation in the food sector and objective statistics to support the process of decision making in economic matters.

5.2.5. Public Health

Health policies, under the scope of the ***Ministries of Public Health***, have important areas of intersection with agricultural policies, especially in two aspects: (i) the planning, supervision and regulation activities related to the use and application of toxic chemical substances on the part of producers and rural workers and the attention of emergency situations related to these activities; (ii) aspects referred to supervising and regulating food safety matters

The regulation of matters related to food safety and other bromatological questions are, in many situations, very complex. Countries have accumulated through time a large number of standards, resolutions, executive orders, that address bromatological questions. In some cases these regulations are contradictory or overlapping and add procedures and direct costs which are useless for present day food systems. Almost all countries in the Region have standards that are no longer useful not only in the ministries of public health, but also in state, provincial, departmental or municipal and town governments. They are regulations that confuse the economic agents, introduce inefficiencies and additional costs that work against the functionality and competitiveness of the national food system.

There is an urgent need for ministries of Agriculture and Health to jointly review their common interests and actions in order to improve their regulatory functions which are increasingly sensitive for consumers.

An issue of debate, and sometimes clash of interests, is the distribution and consumption of genetically modified foods. It has generated conflicts within society at large and between the two ministries, with overlapping competencies: Agriculture authorizing, in accordance with the legislation in force in each country, the transgenic events, and Public Health ministries, authorizing the distribution and consumption of food that contains them.

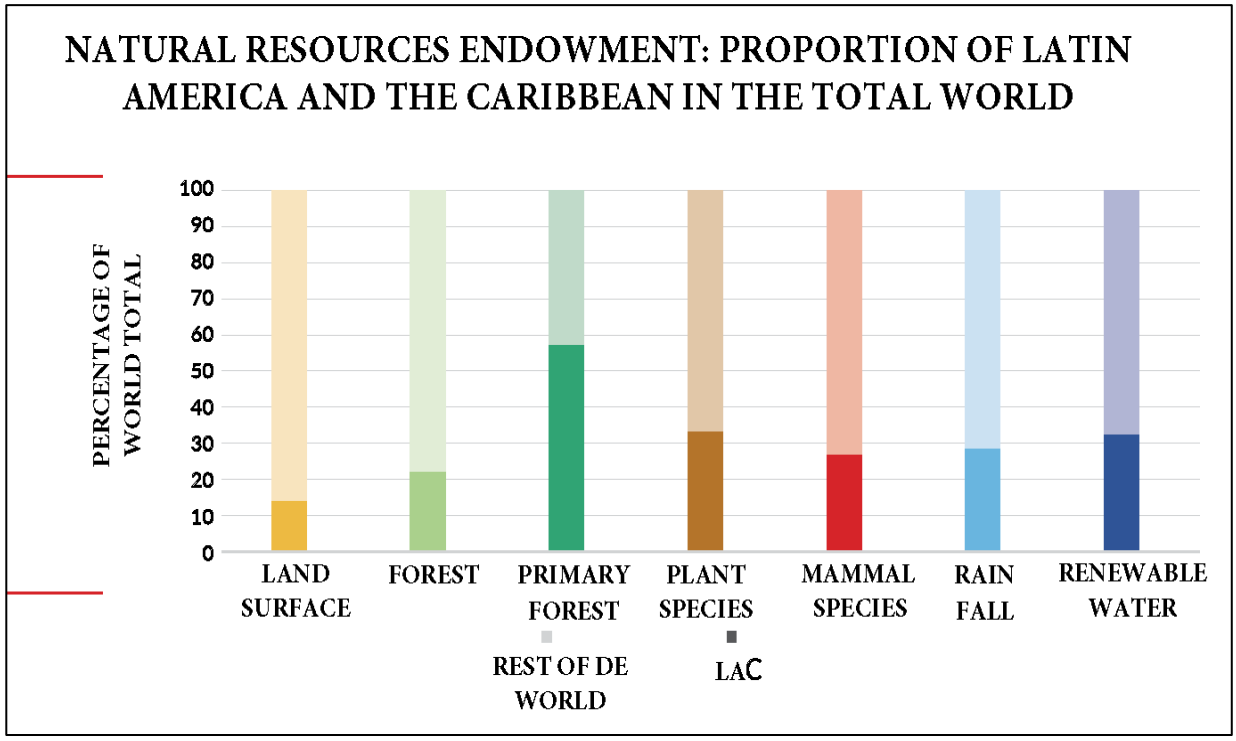
Another theme that has called broad attention in recent years is the high incidence of mortality and morbidity rates, related to non-transmissible metabolic diseases such as obesity, diabetes, hypertension and heart diseases. The higher incidence of these diseases has generated a special attention on the quality of the diet. This has resulted in national and international campaigns directed to impact on public opinion, generating a new attention of the transformation of food systems and new responsibilities for the Ministries of Agriculture that requires developing new institutional capacities and achieving more interaction with the Ministries of Public Health.

One of the main policies aimed at this problem is to increase and improve consumer information through labelling systems. The development of a good international labeling system should be one main objective in this area of work

5.2.6. Environmental sustainability

Latin America and the Caribbean, is one of the main global reservoirs both of fresh water and of biomass and genetic resources. Figure 4.3 shows the importance of the region, compared to the rest of the world, in its endowment of these strategic resources which are so important in determining the life quality of humankind.

Figure 4.3



Source: BM Morris et al Op.cit, Fao 2018b.

This observation highlights the reference made in Chapter I about the importance of environmental issues when considering the food systems of the Region. The point to emphasize is that national food systems must be able to produce with high international productivity and competitiveness but, at the same, preserve and protect the natural resources. Consequently, public policies directed to environmental preservation and protection, and the economic incentives provided

to agricultural production must be carefully harmonized and applied in the rural territories themselves, especially in connection with fragile ecosystems.

The Ministries of Agriculture and of Environment are the institutional entities with shared responsibilities in this area that include a great number of different situations and problems that require a coordinated work. Among them, it is worth mentioning: a) productive practices that reduce the net emission of greenhouse gases on the part of the food system, b) territories with high desertification risks, fragile wetlands and native forests, key for the environmental and hydric balance of broad regions, c) pastures and savannahs with native species adapted to the agro-climatic conditions, exhausted soils and courses of water with growing levels of contamination; and d) deforestation, the destruction of biomass for agricultural and cattle production. All of these are elements that irreversibly affect hundreds of territories and habitats, affecting the quality of life and livelihoods of thousands of people and communities. Deforestation and the destruction of natural habitats has moved some importing countries to impose trade restrictions to those products that are not being produced under certified environmental conditions

Territories that suffer deforestation require special care. Their occupation and economic utilization by the private sector frequently generates institutional and legal conflicts between the ministries of agriculture and other institutions that have environmental regulatory competences. Accordingly, a virtuous and articulated interaction between ministries with shared responsibilities is increasingly necessary in all matters relating to enforcement, control and certification at a domestic level. This will make possible that the Region informs and assures other governments, as well as consumers, that the environment and its natural resources are duly protected and respected.

Ministries of agriculture also have a shared area of competence with ministries of the environment in regards the control and effective compliance of international commitments that each country has undertaken as regards the reduction of greenhouse gas emissions by its national food system. This is a very sensitive issue from a social, economic and political viewpoint in all countries of the region and requires a political consensus and consistent and coordinated actions between both ministries.

6. The Ministries for Food and Agriculture

The organization, capacities and effectivity of ministries of agriculture has been a subject of intense academic and political discussions in the Region. [105] These discussions have sought to find specific and applicable responses to the following questions: Are the ministries of agriculture obsolete, frozen in a model of the XX Century? What do they need to effectively attend the new reality of food systems, both in terms of regulation, oversight, control, traceability and certification, and also in relation to incentive, promotion and investment policies?

An undebatable role for the ministries of agriculture is related to the health and phytosanitary status of the countries so that they are able to export, overcome quarantine obstacles to trade and to discourage the application of non-tariff barriers. The ministries must be quite stringent at the time of regulating and overseeing the traceability of food products and secure the utmost academic

[105] See, for example: Pineiro, Martin editor. Institucionalidad agropecuaria en América Latina: Estado actual y nuevos desafíos FAO, 2009.

excellence in the case of conflicts. It is a very important role because the access to agricultural markets depends on this function.

Another function which is important, but is complied with a high degree of dispersion in terms of quality, effectiveness and efficiency is the provision of technical assistance and rural extension services, in charge of delivering the necessary and appropriate technologies to all types of farms.

Many other functions such as monitoring prices and markets, the preparation of agricultural statistics, monitoring agricultural risks (climatic, plagues and diseases and markets) are all functions that are generally within their competences. However, not all these functions are implemented with the same consistency, intensity and effectiveness in all countries. Performing such functions effectively requires not only internal capacities but also an adequate and effective interaction with other areas of government.

Therefore, one important objective of any program directed to the modernization of the ministries of agriculture should aim, in addition to modernizing and strengthening their own structures in order to perform their specific functions with the highest level of excellence, to strengthen the synergies and complementation with other ministries and public institutions. This also includes institutionalized political dialogue with agricultural and non-agricultural private sector to address the new complexities of the food systems.

The institutional structures of the ministries of agriculture[106] in the world are variable. In ***Europe*** [107], most of them have clear and defined competences on: (i) the agricultural sectorial policies; (ii) animal and plant sanitary situation; (iii) agricultural science and technology and extension; (iv) rural development; (v) ***food production*** and the relationship between production and consumption, (vi) food safety, traceability and regulations for the certification in these fields; (vii) natural resources and the environment; (viii) fisheries and (ix) forestation, in most cases.

In addition, they have extensive competencies on food and nutrition regulatory matters for the promotion of productivity, competitiveness, quality and safety which are distributed within their several directions and executing units.

It is interesting to see, for example, some of the functions and competences of the Ministry of Agriculture of the ***Russian Federation***, given its importance in global agricultural markets. Its main functions are: (i) development and support of agriculture, livestock and fisheries; (ii) rural development; (iii) regulation of agricultural markets; (iv) fishing and transforming industries; (v) quality of products; (vi) records on phytosanitary, fertilizers and other inputs; (vii) sanitary and phytosanitary policy and (viii) international cooperation.

Food, nutrition and food systems are concepts that are not explicitly mentioned although there are policies and function related to them which suggests a more holistic conceptualization of a food system.

[106] The review was made based on institutional and official web pages of the ministries of agriculture, which were selected due to the relative importance of the countries in agricultural and food world trade.
[107] Ministries of Agriculture of Europe revised in terms of their structures, functions and competences: Spain, France, Germany, Italy, Ireland, United Kingdom and Poland.

The case of two other influential countries in the global agricultural and livestock markets such as ***New Zealand and Australia***, show, in their respective ministries of agriculture, a broad array of functions, competences and actions, which incorporate the concepts of food and nutrition, with a systemic vision. In the case of ***New Zealand***, the Ministry of Agricultural intervenes directly supervising the food industries, to insure the quality, and safeness of food for consumers and the compliance with standards and regulations, which are supervised and certified by the ministry, throughout all the food chains. New Zealand's strategy in regards to its Ministry of Agriculture appears to be quite consistent with a food systems vision, which not only seeks to regulate, control and certify, but also to inform producers so that they understand and adopt the production requirements regarding health and phytosanitary regulations, which guarantees access for their products to the domestic and export markets. The ministry provides technical assistance to producers and exercises competences on the development of rural territories. The vision that the ministry offers is based on its contribution to "New Zealand as the most sustainable supplier of food and high value primary products in the world". The concept of food is clearly incorporated in its institutional management and operations.

The DAFF (Department of Agriculture, Fishing and Forestation) of ***Australia***, has, among its wide variety of functions, a department specialized in "food trade" that interacts with other technical and regulatory areas within the ministry which are necessary to fulfill its competences.

The ***USDA*** has broad competences in terms of sectorial policies, incentives to production, animal and vegetable health, quality of agricultural products and foods, technical assistance through local agencies, incentives for productive chains,

management of water and soil conservation, access to markets, commercial promotion and application of quarantine measures and sanitary protection of imported agricultural and livestock products. Food products and their quality, safeness, and the authorization for their human consumption, are within the scope of the ***Food and Drug Administration (FDA)***. This agency regulates and controls safety standards such as the presence of harmful chemical substances, labelling standards, which reflect the nutritional features of food, that packaging clearly show the ingredients and the traceability of raw materials. The Agency is also responsible for overseeing the quality of diets and research and development, activities. It is also responsible for authorizing foods that may be consumed which has an impact on trade and imports.

Finally, in this summarized and partial vision of the degree in which the concept of food, nutrition and food systems are incorporated in the competences and functions of the ministries of agriculture, it is worth looking into the **People´s Republic of China** situation. In this case, the Ministry is called of Agriculture and Rural Affairs and has competences in the agricultural production policies in a wide array of issues which include sanitary, phytosanitary questions, production and markets, science and technology, bio-economy, agricultural mechanization, fishing and the responsibility for the management of State agricultural farms.

This ministry is also in charge of policies related to rural development, settlement of rural producers, measures related to access, possession and productivity of the land and issues related to the agrarian reform and rural work. It also has a department specialized in the quality and safety of agricultural production but does not incorporate issues related to the environment, natural resources and ecology, which are issues that are the responsibility of two other independent ministries.

In ***Latin America and the Caribbean***, the situation is varied and there are very diverse cases.

A sample of cases where analyzed using the information available in their web pages and organization charts, focalizing on their main executive units, departments and independent entities. The analysis confirms that, in general, the focus of their action is on agricultural and livestock production and on rural territories. In most countries in the region, the Ministries of Agriculture do not have broad or comprehensive competences on the food system but there are departments and/or executive units that include partial aspects of food systems.

The trend of the last thirty years has been to slowly incorporate the concept of food, as opposed to agriculture, to the political, technical, promotional and regulatory definitions used in the ministries of agriculture, although with partial approaches.

In the case of ***Argentina***, one of the countries with the biggest potential for food production in the world (together with its other MERCOSUR partners), the Ministry of Agriculture presents, within its organizational structure, the Secretariat of Foods, Bio-economy and Regional Development. This Secretariat is in charge of the development of strategies, studies, investigations, economic reports, commercial intelligence reports, value chain analysis and prospective analysis which contribute to the necessary coordination with other entities which are jointly responsible for increasing food exports.

Brazil, the main exporter of agricultural and food products in MERCOSUR, has the MAPA (Ministry of Agriculture, Fishing and Nutrition) as a powerful entity responsible for the policies for agriculture, livestock production, forestation, fishing, sanitary and phytosanitary matters, rural development, family agriculture, cooperatives, trade, markets and prices and the application of quarantine barriers to agricultural trade. MAPA also supervises a great national company whose purpose is to insure the food supply to the population, especially the most vulnerable ones, to purchase and sale agricultural products, to aid social plans, to manage food stocks and guaranteed food prices, etc. This is a very important company that has had highs and lows in its role within the Brazilian economy. It does not address the food systems in a comprehensive manner and, as it happens in other cases, the policies and instruments are distributed among different federal and states entities.

Chile has a renowned ministry of agriculture (MINAGRI), especially in regards to three of its main executive agencies. The Agriculture and Livestock Service (SAG), responsible for the animal and crop health within the country including the maintenance of a high and recognized sanitary status, which has positioned Chilean crop and livestock products in multiple markets. A second agency is INDAP (National Institute for Crop and Livestock Development), which has a very significant budget disbursed through a wide network of regional departments which provide farmers, and especially family farms, with technology, information, organizational capacity and training on financing. Finally, the third agency is ODEPA (Office for Agricultural and Livestock Studies and Policies) which is a very powerful unit for the design, analysis and evaluation of policies and prospective scenarios for Chilean agriculture.

Its work includes food systems policies and although the ministry does not address them as such. The main functions of the Ministry have been defined as follows:

"The MINAGRI aims at reducing social inequality strengthening through an expansion of incentive instruments, with a priority in favor of family and 'campesino' agriculture. Another fundamental task is to contribute to the addition of value in agriculture, which implies promoting the development of the agrarian economy based on technology and innovation, as well as on the deepening of the attributes that boost productivity and competition in agriculture: the quality, safety and health of crop-livestock production. At the same time, this development prioritizes in a relevant manner the wellbeing of rural workers, our communities, our culture and our natural resources".

In the case of ***Colombia***, the crop-livestock and rural institutional organization in the public sector suffered significant institutional changes before, during and after the Peace Agreement between the Government of Colombia and the FARC was signed. Recognizing the 'campesino' and rural roots of the armed conflict and the incidence of illegal crops in the irregular farmer economies, the agrarian question was one of the main chapters of the peace negotiations and of the subsequent agreement and its implementation. To such end, the institutionality had to be revised and restructured. The Ministry of Agriculture and Rural Development of Colombia includes a series of very important autarkic entities in terms of their responsibilities and the resources they command. Their responsibilities include areas related to the access and possession of land, rural settlements, natural resources and the environment, especially in departments with fragile ecosystems that are threatened by livestock and agricultural production. Their main goal is to attain a national self-provision of food and to increase agricultural export, boosting

value chains in the Colombian agriculture. The Ministry shares functions that sometimes overlap, with the Secretariat of Planning and the Ministry of Environment.

The Ministry of Agriculture is organized in two vice-ministries: a) The Vice-Ministry for Development, with competences in regulating rural property and the use of soils, management of rural public assets, productive and income generation capacities and b) The Vice-Ministry of Crop and Livestock Affairs that is in charge of policies to promote and support the crop, livestock, forestry, fishing and aquiculture value chains, financing and management of risks, innovation and technological development and sanitary and phytosanitary protection.

There are, in addition, entities and/or corporations which have responsibilities on issues related to rural development, restitution of lands, renewal of the territory, management of promotional funds and of financial risks, research on crop and livestock production improvement. In addition there are public corporations, with limited functions in relation to the public supply of grains and other foods. Their functions are limited, at least in the current circumstances, but their performance and incidence is quite different, according to the territory where they are located and their socio-economic context.

It can be seen that neither the Ministry, nor its autarkic entities, have incorporated a food system concept and do not have a holistic approach except that several departments and units take care of some key topic in the national food system.

Mexico, is one of the most influential countries in the region and its agriculture had to adapt, since 1994, to operate within the framework of the North Atlantic Free Trade Agreement (NAFTA), which meant very dramatic changes for a very extended

and heterogeneous country with very different agricultural production areas. On the one side, a competitive commercial crop and livestock agriculture, integrated to internationalized agro-industrial value chains and on the other, regions and states where campesino agriculture still struggles to gain space as a key activity for the development of its communities and territories and to insure the livelihood of these populations.

The Secretariat of Agriculture, Livestock, Rural Development, Fishing and Nutrition (SAGARPA in Spanish), has the purposes of: *"fostering the exercise of a support policy that enables the country to produce better, exploit better the comparative advantages of our agricultural sector, integrate the rural activities to the productive chains in the rest of the* ***economy an****d promote the collaboration of producer organizations with their own programs and projects, as well as with the proposed aims and objectives for the agricultural and livestock sector, in the National Development Plan"*.

SAGARPA is assigned development functions for the agri-food sector, but the approach followed by its executive units does not have a systemic nature and the instruments of policy and the resources used are spread and many times overlap with actions of other local institutions.

The SAGARPA includes both in its name and in its description of functions, responsibilities referred to food and nutrition. In its functional organizational chart there is an Undersecretary that must specifically deal with the food and nutrition sector. However, as in other countries in the region, this is more rhetorical than real. In fact, it is the Secretariat of Social Development (SEDESOL) that has the mandate and the resources to implement the design and application of the most

effective programs related to food security strategies and policies in Mexico. On the other hand, the institutional responsibility to enforce regulations related to food trade is distributed among different entities of the federal government and the States that compose it.

This brief analysis suggests that in several important and influential countries in terms of agricultural and food trade, the role of the Ministries of Agriculture, is always present as regards issues that have impact on the performance and competitiveness of the food systems, but in almost no case are they addressed from a systemic perspective.

7. The needed Institutional organization

7.1. Considerations prior to the concrete proposals

When the Ministries of Agriculture were created in Latin America and until the middle of the last century, the main determinants of what each country used to produce were what they knew how to produce due to cultural and historical knowledge and the comparative advantages they had, based on their natural resources and the capacities of their rural population. On the other hand, the consumer countries purchased what the exporting countries offered in the conditions they were offered. This started to change in the 70s when both the technology and the increased power of consumers changed the rules of the game and drove institutional reforms in many countries of the region.

The consolidation of food systems that is taking place now, both at a national and global level, posed new questions and challenges in terms of the public policies and

consequently the need to adjust public institutions to the new economic, social and technological conditions.

As regards the national food systems, the main responsibility of governments is the food security of the whole population. Beyond ideologies and the diverse political approaches, the governments must protect the most vulnerable sectors of the population and insure their adequate access to food, applying strategies and policies of social protection and of food and nutritional security, when necessary.

On the other hand, the governments must also insure that local and national food systems comply with the other four attributes described in Chapter III. This is especially important in the case of those countries that are food exporters and that must adapt to the demands and restrictions imposed by importing countries.

These new needs and challenges in the scope of public policies make it necessary to examine and rethink the public institutions, responsible for the food systems. It requires adapting and simplifying its complex legal frameworks and revising the functions assigned to the Ministries of Agriculture. To such end, some general principles to take into account are the following: (i) standards must look for participation schemes and consensus among all the players that are part of the value chains and the food systems and subsystems; (ii) recognition of the interdependence of all participants; (iii) clear guidelines to insure the highest effectiveness and efficiency of the food systems; (iv) strengthening the institutional mechanisms responsible for the application of regulations improving their technical quality and providing for the training of their human resources, and the needed equipment; (v) regulating the transparency and accountability of the whole system, which assures the trust of consumers and the participating commercial agents; (vi)

fighting against corruption so that the law is impartially enforced and with scientific rigor.

7.2. Possible alternatives to improve food systems public management

To implement a successful political and institutional process aimed at modifying the existing public sector institutions to adapt them to the objectives of developing and governing a more competitive and sustainable national food system is not an easy task. It requires requires a solid political system and an ample social consensus, within all the participants involved in the food system.

The current food systems include a large number of economic participants and productive processes that are necessary to produce and supply, on a daily basis, an enormous variety of foods to the table of millions of consumers. However, and in spite of this complexity of the food systems, the design of public institutions that are in charge of promoting, supporting and regulating them should be, both in its "anatomy" and its "physiology", as simple as possible to avoid inefficiencies, bureaucratic obstacles and unnecessary regulations that limit freedom in production and trade.

In the following section, four plausible options are presented for an institutional organization that could be responsible for the oversight of the national food systems. The main objective, in all four proposals, is to strike a proper balance between the effectiveness of policies applied to the national food systems, taken in a holistic manner, and the possibility of having governmental interventions that overcome a partial or sectorial logic.

The four alternatives, which are fully developed latter, are: (i) a better articulation and coordination, within the already existing institutionality which requires the existence of an institutional space within the government that could function as facilitator and organizer of such coordination; (ii) the creation by Law, of an organizational entity, which could be a Department, Under Secretariat or Secretariat for Food Systems according to the organizational features of the country. It would be at the level of the Head of Government or Presidency of the Republic and would require a powerful political consensus to exercise its competences and to have sustainability in time; (iii) strengthening the institutional mandate of the current areas that have responsibilities over food and nutrition matters in the current Ministries of Agriculture, revising their mandates, functions and operational structures; (iv) the creation of a "ministerial cabinet", of a permanent nature, for food systems. It would be supported by a specialized committee, with representatives of the private and the science and technology communities.

7.2.1. A Better Articulation and Coordination within the existing institutional Organization

This alternative does not entail big institutional changes. It only requires assigning new coordination functions, and the necessary budget to exercise this coordination, to an existing executive unit near the top level of the Executive Power such as a Secretariat within the structure of the Head of Government.

The appointed secretary or deputy secretary would be in charge of convening all the participants in the national food system, for the implementation of plans,

programs, projects, or specific initiatives arising from any of the following three organizational levels of government: (i) at national level, ministries that present initiatives, preferably shared by several of them, about a given territory or sector or certain food subsystem; (ii) at state, provincial, regional or departmental level, initiatives presented by the locales authorities, supported at least by a sectorial ministry; (iii) initiatives presented by local authorities such as mayors, supported by a sectorial ministry. The secretary would also have competence to support initiatives and actions proposed by the private sector, represented by companies and/or their unions, provided that the initiatives are supported by a sectorial minister. To implement these initiatives and insure their permanence in time, a strong political support will be required not only in the executive branch of government, but also in the parliament.

The proposed institutional mechanism is a potentially effective instrument. It can generate more agile and effective responses if exercised through a political dialogue with the private sector, without steamrolling the functions of other governmental units and building on the existing opportunities for coordination and consensus.

7.2.2. Creation of a new Secretariat for Food Systems, at the level of the Head of Government or Presidency of the Republic

This proposal is similar to the previous one but includes the creation of a new Secretariat, or similar structure, for food systems closely linked to the head of government. This new organizational element provides a stronger political message and more explicit bureaucratic power.

This new Secretariat would be a coordination unit responsible for planning and allocating funds to activities directed to the strengthening of the national food system. It would have the capacity to decide on its own and external budget resources and it would take actions based on Annual Plans agreed with other Ministries and Secretariats which would be responsible for the execution of the agreed actions. The Secretariat would have the legal authority to guide the utilization of the budgetary resources that have been allotted to the sectorial ministries intervening in the investments and regulatory and/or promotional actions for the food systems, once the proposed plan of action has been approved by the Council of Ministers. The Secretariat would not have administrative or technical structures of its own, or overlapping executing units. Once the plan of action is approved in the Council of Ministers, the Secretariat would authorize and oversee the use of financial and investment resources used for the execution of the agreed actions by the specialized units of the competent ministries.

This Secretariat would also be in charge of facilitating and conducting a permanent dialogue about public policies referred to the food systems, with the private sector, in order to build consensus and enable the structural changes necessary to generate a favorable institutional environment for the competitive functioning of the national food system.

The Secretariat has the responsibility to submit annual plans and/or specific actions for Cabinet approval.

7.2.3. Ministries of Agriculture with enlarged competence on the food system

In several countries of LAC, the ministries of agriculture have, as in the EU, undertaken activities and competences related to the food systems as such, articulating and coordinating policies, instruments, and resource. In most cases strengthening this type or organizational structure would require legal reforms in order that these competencies are expressly defined in the mandates of the ministries of agriculture. The existence of a Secretariat for food systems and the appropriate budgetary and territorial dimensions would need to be incorporated.

7.2.4. Creation of a Cabinet for the Food System and a Sectorial Committee

This is the most attractive and powerful of the four options, but is the most complex from an implementation point of view. It has been used by some countries to address the environmental issues arising from the UNFCCC[108]. A wide political consensus to implement it, in a permanent manner, is also required. The formula is attractive, because of the broad representation and political power it entails which offers the opportunity for a political dialogue, specialized and sustained in time with the private sector. This is necessary in order to generate analytical capacities, the construction of strategic proposal and the permanent collaboration of the private sector for the execution of public policies.

Its institutional location of a Cabinet for the national Food System would be within the Presidency or Head of Government structures. The secretariat function would be assigned to the Secretariat of Planning, in those countries that this secretariat exists, or in another exiting secretariat most likely within the Ministry of Agriculture.

[108] UNFCCC – United Nations Convention on Climate Change

In addition to the Cabinet and the specific Secretariat, a Sectorial Committee would be created with the participation of the private sector representatives which are main participants in the food system. They would have the responsibility of participating in the deliberation of the Cabinet, advising the government in food system matters and presenting concrete initiatives.

These two instances would be responsible for the medium term planning of: (i) the investment policies, necessary to strengthen the food system; (ii) the development of policies and investments in those territories where food systems operate and have the potential to be competitive and commercially successful and assuring they are inclusive in relation to all types of farmers and of the rural population; (iii) implementing the environmental policies and regulations indispensable to insure the sustainable use of the natural resources and at the same time, the competitive performance of food systems; (v) the coordination of policies directed to promote agro-industrial and local value added; (vi) promoting public-private and private-private alliances; and (vii) the facilitation of food trade at national, regional and international levels.

Oversight in regards to implementation would be the responsibility of a Committee of General Directors of each Ministry who will have the responsibility to represent the interests and possible contributions of each of the Ministries in relation to the collective actions that have been agreed by the Cabinet.

CHAPTER V

THE GLOBAL FOOD SYSTEM: SOME PROPOSAL FOR A BETTER GOVERNANCE

1. INTRODUCTION

In Chapter IV it was showed that, in most countries of Latin America, and also in the rest of the world, the organizational structure of the state is insufficient to have a general and comprehensive vision of the national food system. The organization structures are disarticulated in several independent compartments that act with little coordination and, therefore, in a manner disconnected from the economic, productive and social processes that compose the food systems which increasingly require a systemic vision.

The absence of a systemic vision has brought about serious difficulties and a lack of capacity to define and implement adequate public policies for the promotion and regulation of food systems that comply with the five necessary attributes, developed in Chapter III.

These features of the institutional organization in the countries have also resulted in deficiencies and similar limitations in the institutional structure global governance mechanisms. At the international level, we find an insufficient governance to accompany and guide the processes that have led to the rapid development and growing complexity of the global food system. An evidence of this is that currently, there is no organization or institutional mechanism that has the main mandate of safeguarding the development, configuration or operation of the global food system taken as a whole.

The United Nations (UN) organization more directly related to food matters is FAO (Food and Agriculture Organization) that includes in its name the concept of food, although it is not clearly reflected in the basic documents that guide the organization. The result is that, throughout its institutional life, the FAO has dedicated it efforts mainly to agriculture and rural poverty. Even if it is true that, during the last three decades, food safety has been a focus area, and important achievements were attained, the organization has not advanced in an approach that included the global food system in all its dimensions and complexities.

Other bodies in the system of the United Nations have institutional mandates that include partial aspects of the food system: a) the World Food Program (WFP) is in charge of food crises, b) the UN Environment Program (UNEP) is in charge of issues related to the environment, c) the World Trade Organization (WTO) is in charge of multilateral trade issues and d) the World Health Organization (WHO) takes care of issues related to human health and its relationship with zoonotic diseases. On the other hand, the International Fund for Agricultural Development (IFAD) has been in charge of financing the poorest countries and rural sectors to improve their quality of life and get them out of poverty. It also intervenes in the financing of projects aimed at improving the food safety of poor populations

The World Bank is an important player in the area. Even if its mandate is broad and includes all the sectors subject to international financing, it has had an important role in funding projects directly related to some aspects of food systems, including food insecurity situations

There are also other organizations with specific mandates of global nature, related to the global food system, such as the World Organization for Animal Health (OIE)

and also organizations of regional nature such as the Inter-American Institute for Cooperation on Agriculture (IICA), which is associated to the Organization of American States (OAS), which has a specific mandate on agriculture and rural development

On the other hand, the General Secretariat of the United Nations has a series of programs, initiatives and special under secretariats that have a direct link to foods.

However, as can be seen in the description made of such bodies in the following section, none of these organizations or institutional mechanisms has a specific, and at the same time broad, mandates that includes the food system as a whole. On the contrary, UN bodies many times compete among themselves or carry out activities that represent an overlap and/or a lack of coordination in their actions.

The most ambitious attempt to achieve a coordinated action in the system was the creation of the Food Safety and Nutrition Program on the part of the Secretary General of the United Nations in 2000, which was run by David Navarro, who was unable to lead the rest of the bodies in a common vision and joint action in the specific topics directly related to food and nutritional safety at a global level.

The G20 is a special case. Even if it is not an organization in a formal sense and its mandate has been public finances, their declarations and recommendations have extended, throughout time, to cover many other areas of international policy, especially in terms of the work developed by some of its affinity groups and very especially the T20. [109]

[109] The G20 has conformed a series of affinity groups. One of them is the T20 which composes the Think Tanks of the world and is in charge of the development of work and proposals of potential interest for the G20.

The work of the T20 has included trade as a topic of special significance and in recent years, and more specifically during the Argentine presidency in the year 2018, agriculture and nutrition received special attention in the T20, in the B20 and in the meeting of the Ministers of Agriculture.

Finally, in 2020, the Secretary General of the United Nations convened in September 2021, the United Nations Food Systems Summit with the idea of having a general discussion that develops the concept and suggests general policies for the development of a global food system that responds to the new and urgent needs of humankind.

This call is a very significant event and may lead to the beginning of a collective action at an international level. A possible result of the Summit and its follow up activities, that would represent an essential and very necessary step in the development of humankind, would be the creation of a global governance mechanism for the global food system. This mechanism could contribute to promote a dialogue and the collaboration of all countries in the implementation of policies and programs, at the national level and in streamlining the activities the United Nations organizations, and other of a regional nature, to contribute to a more balanced and fair development of the global food system

A result of this type could be an enormous contribution to the process of construction of global governance mechanisms able to effectively influence the organization of a global food system appropriate to present and future needs.

This Chapter describes, in a first section, the current situation in those organizations that include in their institutional mandate some aspects that are relevant for the food system. The weaknesses of the current organizational framework to effectively

affect the operation and development of the global food system are also analyzed. In a second section, we advance some ideas that could be useful to build a more powerful and potentially more effective organizational structure that could lead to a better global governance of the food system.

2. THE EXISTING ORGANIZATIONAL STRUCTURES

The global organizational structures that currently have a direct relationship to one or more aspects of the food system are many and very diverse. The most important ones are the organizations that belong to the UN system, although there are other institutions, already mentioned, that have a significant role.

1. The United Nations Organizations

The United Nations family includes a number of organizations of considerable size and incidence in global governance issues. However, the mandates of these organizations only include partial aspects of the global food system.

FAO (Food and Agriculture Organization) is the entity within the UN system that has the broadest and most explicit mandate regarding the development and governance of the global food system. Its official name includes, in equal footing, food and agriculture and its basic document, its Constitution, privileges the attention to agriculture, but also includes, in a very significant way, issues related to nutrition[110].

[110] FAO, Basic Texts Volumes I y II, 2017 edition.

The Constitution of FAO identifies as main objectives for individual and collective actions of the Organization's member countries the following matters:

- **Raising the levels of nutrition and livelihood of the people under their respective jurisdiction**
- **Improving the performance of production and the effectiveness of distribution of all foods and agricultural products**
- **Improving the welfare of the rural population**
- **Contributing to the expansion of the global economy and freeing mankind from hunger**

It can be seen that, even if there is a clear emphasis as regards the crop and animal production matters and the welfare of the rural population, the issue of food, both in relation to its production and distribution, receives significant attention.

On the contrary, if FAO's institutional mandate is analyzed from the perspective of the five dimensions/attributes that are described in Chapter III as the core and necessary elements of the global food system, we can see that only the dimension/attribute 1, referred to the production and productivity to eliminate hunger in the world and dimension 5, referred to the economic and social sustainability, are fully included.

The dimensions 2, 3 and 4 referred to environmental sustainability, the safeness of foods and human nutritional concerns, respectively, are not fully contemplated in the institutional mandate of FAO. This omission is explained because those issues were not urgent matters in the international agenda at the time of FAO's foundation and have only acquired a strong political dimension in the last few years. Additionally, the emphasis on agriculture and rural development was determined

by the fact that the *de facto* representatives in the governance of the institution are the Ministers of Agriculture of member countries.

An analysis of the organizational structure of FAO and its main work programs show a certain level of disconnection with its basic institutional mandate. This disconnection is especially shown through three elements that are significant as regards its positioning in connection to the global food system.

The first has to do with the little attention that FAO has given to the components of processing, distribution and marketing of foods in spite of being expressly included in its institutional mandate. In the organizational structure of the entity, there is no institutional niche that is responsible for these aspects of the food system. Only since the year 2016, FAO has organized its work program around five big Programs, one of which has as its main focus the food systems. Based on this new organization, the FAO started to incorporate some of the broadest issues related to food systems. In the year 2017, these programs were institutionalized in the organizational structure of the FAO to be later eliminated in 2019.

A second disconnection is referred to the important work that FAO does in topics related to the conservation of natural resources and more recently to global warming and the global sustainability of food production, in spite of the fact that these topics are not expressly incorporated in its institutional mandate.

This disconnection is explained by the growing importance and urgency of environmental sustainability, the interest of member countries, and the availability of resources extra-quota, that allow the organization to work on these themes.

Finally, a third element to mention is the little work carried out by FAO as regards the dimensions/attributes 3 and 4 related to the issues of safeness and the

nutritional qualities of foods, respectively. These concerns have increased in the last few years and have taken some preeminence, partly as a consequence of the COVID-19 pandemic.

However, in the area of safeness, FAO has had a very relevant and specific activity through the Codex Alimentarius. The Codex is a unit with a high degree of autonomy and has effectively dealt with certain aspects related to the safeness of foods and, in particular, the standards used in international trade in relation to potentially toxic products.

Therefore, it could be concluded that FAO has had a very high degree of specialization in the development of agriculture, food safety and rural poverty. As a consequence of this, it has not had a broad and inclusive vision as regards the global food system and has not included in its working program a comprehensive treatment of the five dimensions/attributes of the global food system described in Chapter III.

The **WFP** (World Food Program) was created as a special program of FAO. However, with the passing time it has become a virtually independent organization that has its own government bodies and budget. Its mandate is narrow and clearly focused on addressing crisis situations in its humanitarian components and very especially on addressing the alimentary needs of the affected people. Notwithstanding, in the last two decades, the WFP has progressed in several countries of Africa and Central America in providing support of food production activities, especially for crop and livestock production systems that contribute to the provision of food for the poor.

The entity develops most of its activities in the field and does not have important functions in the gathering of statistics, information and development of standards or investigations with normative value.

IFAD (International Fund for Agricultural Development) Its main mandate is to invest in rural poverty attempting to resolve the causes that reproduce it. Its main focus is to develop agricultural systems able to sustain the rural population based on the self-supply of food and the generation of income from its participation in rural labor activities. When the IFAD grants loans to the countries to carry out public policies and investments of a systemic nature in the rural territories, it contributes to attend the food safety and the production of food by the poorest rural population in the lowest scale of production.

The UNEP (United Nations Environment Program) is the UN organization in charge of safeguarding all issues related to environmental sustainability. Its main function is to establish the environmental agenda at a global level. [111]

The Organization has an extremely important mandate in terms of current global concerns, but narrows in terms of the multiplicity and range of the topics that are included in the concept of a global food system.

UNEP's work program has been focused on this very specific institutional mandate and, therefore, it has tried only marginally, to define or influence the construction of a more efficient and balanced global food system. Its focus has been related to the dimension/attribute number 2 reffered to environmental sustainability. An

[111] https://www.unep.org/

example of this is the work in the use of chemical fertilizers and antimicrobial agents in agriculture.

WHO (World Health Organization) is the United Nations organization in charge of human health in all its dimensions. Its Constitution sets forth in Section 1 that the purpose of WHO will be to "reach the highest possible degree of health for all peoples". [112] This general regulation has been construed in the 2019-2023 General Work Program as: "promoting health, preserving global safety and serving vulnerable populations".

Its institutional mandate is clearly circumscribed to human health and its activities include the research, the design and negotiation of global standards and the active participation in support to the national health systems.

In recent years, the organization has incorporated to its work program two topics of great relevance for the global food system: a) animal diseases that could be related to human health. This relationship is expanding and acquiring great relevance for the growing links between humans and animals as a consequence of climate change; and b) the attention to non-transmissible metabolic diseases increasingly more frequent, especially in the most developed societies, which are related to sedentarism and the quality of diets. On the other hand, it does not include in its work plan a special attention to topics related to the safeness of food.

The WTO (World Trade Organization) is the most recent of the United Nations organizations. Created in 1995, it has a precise mandate that is supported in two main functions: a) serving as an institutional space for the negotiations that lead to the establishment of multilateral trade rules; and b) establishing and managing the

[112] WHO Constitution, October 2006

necessary institutional mechanisms for the resolution of commercial controversies between member countries.

The entity is devoted to trade in a broad sense and agricultural trade is an important part of its mandate. However, this is one of the areas where there has been less progress in terms of the liberalization of multilateral trade. Given that the international trade is a core element of the global food system an effective WTO and the construction of an adequate environment for agricultural and food trade has a great importance.

Two topics of particular importance as regards the agricultural negotiations are: a) the negotiations tending to the dismantling of the tariff protection systems and domestic supports, especially direct price support measures which are highly distortive and directly affect food trade; and b) the incorporation of trade standards and regulations related to the protection of the environment and the safeness of food that are in the implementation process. These new standards are necessary, but must be based on scientific principles and not become new non-tariff barriers of a discretional nature.

However, and in spite of the importance of the described topics, the organization does not have a mandate for the development of the global food system from a systemic perspective.

1. The G20 and its support groups

Even if the G20 was created as an instance of coordination of the international financial system, throughout the years, it has incorporated other topics of global dimension. One of them was the global food system that received much attention

in 2016 during the Argentine presidency. Both the works of the T20 and of the B20 focused on several aspects referred to the global food system.

The works of the B20 were especially important. In the main publication edited by them, with the active participation of the private sector related to the food industry, there are important commitments linked to the nutritional aspects of food, and a series of recommendations on how to progress in the development of a better global food system.[113]

Another important contribution was made by the Inter-American Network of Academies of Sciences (IANAS) through an elaborate document on food systems in the American hemisphere. [114]

2. Other multilateral organizations including those of a regional nature

In addition to the organizations of the United Nations system and of the G20 and its affinity groups, in particular, the B20, the T20 and the Science Academies, there is a series of other international organizations with competences directly related to the food systems. Two cases, already mentioned, have especial importance: a) the European Commission, b) IICA (Inter American Institute for Cooperation in Agriculture) with special importance in the American hemisphere.

The **European Commission** represents an important number of countries which are very vocal in the treatment of global topics and its voice transcends its regional dimension. Its recent proposals, identified as the Green Deal and the Farm to Fork, are inclusive and represent topnotch proposals as regards how the food systems of

[113] B20 Sustainable Food System. Policy Paper B20 Argentina 2018

[114] Interamerican network of academies of sciences: Challenges and opportunities for food and nutrition security in the Americas. IANAS Regional report November 2017

the countries that integrate the EU could develop. In particular, the treatment given to the development of environmentally sustainable food systems, represents an ambitious and inclusive proposal that will have a large impact at a global level.

IICA (Inter American Institute for Cooperation in Agriculture) is the entity specialized in agriculture of the Inter-American System. It was created in 1942 and therefore it is one of the oldest multilateral bodies. Its mission is defined as "encouraging, promoting and supporting the efforts of the member states to achieve their agricultural development and rural welfare by means of a international cooperation of excellence".

The IICA has focused its work program in accordance to its institutional mission. Its work is focused on the rural environment and agriculture in a broad sense that includes topics related to environmental sustainability, crop and animal health and trade. Even if this work program does not include all the dimensions which are relevant to the food systems, it is sufficiently broad to allow for the Institute to act as an authorized spokesperson in the topics of food systems from the perspective, realities and interests of the American Hemisphere.

3. The institutional mandates and the need for more coordination

The brief analysis of the institutional mandates and programmatic orientations of the main multilateral and regional organizations that currently exist clearly show that none of them has a constitutional mandate with the programmatic amplitude needed for a comprehensive and complete view of all the aspects related to the global food system.

The organizations of the UN system have constitutive mandates limited to specific aspects of the food systems and in most cases, they are solely focused on one of

the five dimensions/attributes of the food systems introduced in Chapter III. FAO is a partial exception and has the broadest constitutional mandate which includes, at least partially, several aspects related to the five mentioned dimensions/attributes. The weakness of not including all the necessary dimensions in its mandate is worsened by the fact that the members of the main component of its governance system, the Conference, are the ministers of agriculture of the member countries that generally have an agricultural focused vision about food systems.

The G20 is an important and interesting instance of global governance. As mentioned above, in 2018 during the Argentine Presidency, G20 deliberations gave great importance to the global food system. However, the limited number of countries that compose this institutional mechanism subtracts authority and leadership in food related issues that have a high political link to civil society in all countries of the world.

Finally, in regards to the regional organizations it is important to highlight the important role of the European Commission in the conceptual definition and identification and development of standards that regulate the food systems. Even if its proposals have been made for the specific scope of the European Union, they are strongly influential within in the global scope and had an important conceptual role in the deliberations of the Food Systems Summit.

On the other hand, IICA has a mandate and programmatic capacity in the area of food systems and had an important role in the UNFSS acting as a spokesperson of the visions and interests of the Region.

Options for strengthening the governance of the Global Food System

The main conclusion arising from the analysis of the competences and capacities of the existing international institutions is that existing global governance mechanisms are weak. The Food Systems Summit has given a new importance and urgency to the task of building a global institutional mechanism devoted to development of an efficient and balanced global food system and contributing with individual countries in the development of national food systems

The first question in regards to this challenge is whether it is possible to advance in an issue of this political and institutional complexity at a time when the world is going through a critical moment in economic and political terms. The answer to this question must be affirmative. The economic and political importance of the global food system, both immediately and in the future, requires an immediate and coordinated action aimed at optimizing the sustainable use of natural resources, insuring the quality and safeness of foods, and guaranteeing an adequate access to food to all the inhabitants in the planet.

A collective action agreed upon by all countries, or at least by the group of countries that are the main food producers and exporters, is an essential step that requires an institutional structure of a global nature, different and much more operative than the existing one.

The existing international experience suggests that the most direct road for this to be possible is to call for the creation of a new international Convention similar to the United Nations Framework Convention on Climate Change (UNFCCC). Such Convention has progressively established the general guidelines, the objectives and the institutional mechanisms, such as the Intergovernmental Panel on Climate Change (IPCC), to gather information and establish parameters and goals of an

indicative nature. The latter serve as a methodological basis for countries to gather information about its specific situation and establish their commitments aimed at the reduction of greenhouse gas emission - the nationally determined commitments - that are periodically presented. Additionally, the Convention includes other institutional mechanisms designed to achieve commitments and propose actions in other areas related to the preservation of natural resources.

The institutionalization through an international agreement with features similar to the UNFCCC, focused on the problems of the global food system, could be a good way to progress.

This new Convention should be accompanied by an organizational structure that is able to carry out the global tasks inherent to the Convention and, at the same time, to support the countries to conduct the necessary studies and implement the necessary actions to comply with the commitments made within the framework of the Convention.

This organizational structure should be able to develop in a permanent manner, and building on what has been achieved in the Food Systems Summit, a number of functions. In addition to the periodic organization of the Convention and reaching agreements and commitments on the part of member countries other important functions are:

1) Generating and gathering relevant information for the global food system;

2) Developing a comprehensive view of the global food system, including a conceptual framework of analysis;

3) Identifying problems and needs and proposing technical and behavioral policies and rules, both national and global, which contribute to the solution of the identified problems;

4) Helping in the coordination of the activities developed by the UN organizations aimed at providing technical support to member countries for the development of their national food systems; and

5) Organizing follow-up activities related to the compliance by member countries as regards the commitments made in their nationally determined contributions.

A set of activities and responsibilities similar to those developed within the scope of the United Nations Framework Convention on Climate Change (UNFCCC).

It is not easy to imagine, and let alone to create, an organizational instance able to comply with each and all of these functions. However, the reasonably successful experience of the UNFCCC suggests possible ways for the organization of the necessary institutional structure to support a Convention focused in the Global Food System

Three main options arise from this analysis, which would be a natural and perhaps politically possible ways to progress. These options are, in fact, three variations on the same scheme that closely follows what exists within the scope of the UNFCCC.

The proposed three options are:

1) Developing an organizational structure to provide the political and technical support to the new Convention, similar to the existing one within the scope of the UNFCCC. The main function of this organizational structure would be to comply with the five points described above

2) In addition to (1) above, assign to FAO the responsibility for providing the technical cooperation to the countries that is needed for the compliance of the commitments undertaken by them within the framework of the Convention, that is to say, the tasks defined in point 4 above; and
3) In addition to (1) above Modifying the constitutional mandate of the FAO and consequently its work program, so that it complies with the 5 technical and scientific functions described above, which are necessary for the good operation of the Convention.

OPTION 1: A new Convention for the global food system with an organizational structure in charge of providing the political and technical support similar to those provided within the scope of the UNFCCC

The organization of the UN Food Systems Summit has highlighted the importance and urgency of achieving an efficient and harmonic development of the global food system and the existing concerns about this issue at a global level.

Achieving progress at a global level will require agreements between the countries to advance jointly and in a balanced manner in actions and commitments that are consistent and fair in relation to the historical responsibilities and present possibilities of each country.

Following this line of thought, the first necessary step would be to convene a Food Systems Convention with the specific mandate of organizing a negotiating and implementation process similar to the ones existing in relation to Climate Change. This Convention would be the context in which the countries would reach commitments on objectives and the necessary actions they would implement to

develop their national food systems according to guidelines and standards agreed in the Convention.

The Convention would require an organizational support system following the lines of the three options described above. The basic core of such organizational structure could be built using the institutional mechanisms created for the organization of the Food Systems Summit, which included the participation of the Secretary General of the United Nations, a series of advising and consultation groups and mechanisms for the collaboration and coordination with the UN organizations.

In this organizational scheme, the rest of the existing institutions would continue with their current functions recognizing the political leadership of the new Convention and the agreements achieved through it.

OPTION 2: Progressing in Option 1 but assigning to FAO the responsibility for providing the necessary technical support to member countries

The previous sections point out that the current constitutional mandate of FAO includes, only in a partial and incomplete manner, the work areas that are implicitly included in the concept of a global food system. Consequently, even if FAO has developed a work plan that includes, at least partially, several areas related to the concept of food systems, its work program is incomplete and partial in connection to this area of work

However, with some adjustments, both of an organizational nature and in its work program, FAO could fully incorporate all the technical components that compose

the food systems and concentrate its technical cooperation tasks in support of the countries in all the necessary aspects that arise from their participation in the new Convention and their compliance with the undertaken commitments.

OPTION 3: Progressing in Option 1 but entrusting FAO with the realization of the five necessary actions of a technical and scientific nature. To such end, FAO would have to reform its constitutional mandate to fully include all aspects related to food systems

Option 3 deepens the line of thought of OPTION 2 increasing the responsibilities entrusted to FAO in order to include all the technical and scientific tasks arising as necessary for the correct operation of the Convention.

For this to be possible, it would be necessary to implement a reform of FAO's organizational structure and of its work program so that the organization includes and fully develops all the areas of a technical nature that are necessary for the Convention and the comprehensive development of national food systems and of the global food system.

In this sense, a reformed FAO could perform the 5 functions listed above with special effectiveness. In order to carry out these new responsibilities, FAO would not only need a comprehensive institutional reform but also an exceptional increase in its budgetary support.

FINAL THOUGTS AND SUGGESTIONS

Throughout the five chapters of this book, it has been highlighted three important facts that now have a wide social recognition. **First**, for a long time, food consumption in the world was mainly guided by culture, traditions and the material possibilities of each territory. With time and especially during the last thirty or forty years, food production and consumption evolved driven by technology and population growth and now it responds to more uniform global guidelines, which are transmitted and spread through trade, the communication media and the movement of people. **Second**, the modernity and, in particular, the growing globalization of food trade has created a vast global food system in which numerous productive chains, private companies and economic processes participate. This global food system produces food in response of the effective demand of the almost 8 billion of global consumers that now exist. **Third,** this vast production and consumption system must, on the one hand, insure an ample supply of food, and on the other, safeguard, the production system to avoid any potential risk in regards to the wise utilization of the scarce natural resources of the planet and for the health of consumers.

This evidence suggests the need for a collective action at a global level to monitor and promote, in a conscious and deliberate manner, the way in which the global food system will evolve in the future. For this to be possible, it is necessary to rely on an organizational component at a global level that is able to comply with certain technical and political functions to build consensus and establish the necessary agreement to progress in collective actions that are fair and balanced.

On the other hand, it is also evident that the reorganization of the roles and functions of international organizations, so that they have a more systemic and harmonic view of the regional and global food systems and subsystems, must have some correlation with the institutionality in member countries. Only in that way will be possible to provide the needed coherence and effectiveness to food policies at a national, regional and global level.

The global organization that has been proposed in Chapter V should be the central element of a global governance system in charge of promoting the development of a global food system that, looking into the future, includes the five dimensions/attributes described in Chapter III in a fair and balanced manner.

ABOUT THE AUTHORS

LUISELLI FERNANDEZ, CASSIO

Graduated as an economist in the UNAM, Mexico and obtained his masters and doctorate in the University of Wisconsin, specializing in agricultural economy and international affairs. Subsequently, he attained a doctorate in Geography and Environmental Studies in the University of South Africa.

Currently an Associate Researcher in the University Program of Development Studies, UNAM and Emeritus Professor of the Instituto Tecnológico de Monterrey (Mexico City Campus). He is also a post-graduate professor in Instituto Mora. He is a member of the Advisory Council for Food Safety of the Americas (IICA, 2020). He belongs to several professional associations.

He was the Permanente Representative of Mexico in the Latin American Association of Integration (ALADI) and Mexican Ambassador in the Republic of Korea, Uruguay and South Africa, being the first Mexican Ambassador during the government of Nelson Mandela.

He was Under Secretary of Standards and Environmental Development (SEMARNAT in Spanish), Advisor to the President of the Republic and General Coordinator of the Mexican Food System.

Within the international context, he was an Associate Director of the Mexican Branch of CEPAL (United Nations) and Deputy Director General for Operations of the Inter-American Institute for Cooperation to Agriculture (IICA).

He has been a professor in several universities in Mexico and abroad. He was the Director of the Department of International Studies of Tecnológico de Monterrey (Mexico City Campus) and visiting professor in the Universities of California (San Diego), Wisconsin and Oxford, England. He received the "Leader in Food Policy" award of the Kellogg Foundation.

He has been recognized in five countries and has the Medal of Merit of FAO.

He is the author and co-author of several books and of more than fifty professional papers. His most recent books are “Agricultura y Alimentación en México: Evolución, Desempeño

Perspectivas" (2017) and "Territorios, Ciudades y Pequeños Productores" (2019). cassioluisell@gmail.com

PAPENDIECK, SABINE

She holds a degree in Political sciences specialized in International Relationships from the Pontificia Universidad Católica Argentina (Honorary Degree) and a Magister in International Economic Relationships and Negotiations of the Universidad of San Andrés-FLACSO-Universidad of Barcelona.

She is a managing partner at ESTRATECO Consultores where she carries out her professional activity as international consultant and researcher specialized in topics of access to markets of agro-industrial products, international commercial negotiations, sustainability and formulation of public – private policies, advising both the corporate exporting sector and governments and international bodies. She is the General Coordinator of the Argentine Neutral Carbon Program (PACN in Spanish) for foods, beverages and exports bio-energies.

She is a member of the GPPS Network and graduate and undergraduate university professor in topics of economy, international trade and sustainability.

She is the author of several publications on sustainability, climate change, world food trade and related topics.

PIÑEIRO, MARTIN

Holds a degree in agricultural engineering from the Universidad of Buenos Aires and a PhD in Agricultural Economics from the University of California, Davis.

Currently he is the director of the Committee for Agrarian Affairs of the Argentine Council of International Relations (CARI in Spanish), advisor to the General Director of the IICA and member of the Advisory Council on Food Safety of the Americas, IICA. He is a founding member and participates in the Consultative Council of the GPS network. He is a crop-livestock producer.

He has been Under Secretary of Agrarian Economy; General Director of the Inter-American Institute for Cooperation to Agriculture (IICA/OEA); president of the Board of the International Food Policy Research Institute (IFPRI) and member of the Program Committees of ISNAR, CIAT and ICARDA. He has published extensively on economic development, international scenarios and agriculture, agricultural policy and innovation and international trade.

RAMOS, ALVARO

He is an agricultural engineer, specialized in Investment Policies for Development, Design and Evaluation of Investment Projects for Development and in International Trade Negotiations in Agriculture.

Currently he oversees the preparation of Final Works in the degree of International Studies in the School of Social Sciences, Universidad ORT in Uruguay, is a member of the National Academy of Engineering of Uruguay, of the Executive Board of Universidad CLAEH in Uruguay and member of the Advising Committee in Food Safety for the Americas, IICA

He was the Minister for livestock, Agriculture and Fishing and Minister for Foreign Relations, in Uruguay and Senator of the Republic, between 1989 and 1998.

For the past twenty years, he was the Coordinator of the Regional Program for MERCOSUR of the International Fund for Agricultural Development of the United Nations (IFAD), working on Public policies for Family Agriculture, Rural Development and the Reduction of Rural poverty.
He has been a consultant for international organizations such as ALADI, FAO, IICA, ONUDI and BID.

TRIGO, EDUARDO

Obtained a PhD in Agrarian Economy at the University of Wisconsin. He specializes in the area of policies and management of science, technology and innovation in agriculture and natural resources, with special emphasis in the topics related to bio-economy, areas in which he has published several articles and books.

He is currently a Professor in Bio-economy in the Center of Agro Business and Foods of Universidad Austral, Argentina; advisor to the Direction of Technical Cooperation of the Inter-American Institute for Cooperation in Agriculture

He has been advisor in the School of Agronomy of Universidad of Buenos Aires and in different national and international organizations, including the Inter-American Institute for the Cooperation to Agriculture, IICA and the International Service for the National Agricultural Investigation, ISNAR, in Spanish, where he acted as Director for Research and Transfer of Technology, and Director for Research, respectively.

As consultant, he has collaborate with the European Union, the Inter-Americano Development Bank, the World Bank, the Institute for Environment of Stockholm, the United Nations Food and Agriculture Organization (FAO), the United Nations Industrial Development Organization (UNIDO) and several crop and livestock research entities of Latin America and the Caribbean.

TRUCCO, MARIO

He is Magister in Agro Business and Foods from the Master's Program in Agro Business and Foods. He holds a degree in Agrarian Administration of UNCPBA.

He is a member of the National General Audit of Argentina (AGN, in Spanish) as specialist in Agro Business, developing analysis and research in Trust Funds related to the implementation of public policies for agro-foods. He has carried out consulting activities as research assistant with the World Bank, the IDB, the FAO, LATN, and CINDES.