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Demand Constraints and New Demands: Regulations, Markets and Institutions Efficiency (A Case Study for Cape Verde)

Bernardo Reynolds Pacheco de Carvalho

Instituto Superior de Agronomia, Lisboa, CIAT-CD Coordinator – International Center for Tropical Agriculture, Portugal
bpacheco@isa.utl.pt

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ABSTRACT

Economic efficiency is a key issue in economic research and for policy design, and certainly for food security challenges. In the food system dynamics the understanding of changes and trends is crucial to improve our capacity to deal with the objectives of sustainable development and quality of life. Food system efficiency evaluation is necessary with regard to production and consumption efficiencies as well as market and governance dilemmas. Regulations and institutional efficiency are crucial aspects that are frequently forgotten, and efforts should be made to improve the capacity to deal with those methodological needs. In many situations, in the real world, data and measurements are difficult or even impossible to get in numeric or quantitative terms. Frequently, a qualitative evaluation is the only way to proceed, but measurements and numeric references are still important, mainly when changes over time are central to the research. The actual paper follows a structural food system model (WFSE – World Food Security Equation) and a *general equilibrium* approach (ICI model – induced changes and innovation model) to show in a country case study (Cape Verde) the important role of markets and institutions as compared to regulation practices directed to improve economic efficiency subject to demand behavior.

Cape Verde is a very challenging country with regard to the *food security status* (where natural resources are very poor for agricultural production) but with great success in global and macro terms in the last 10 years. The main problems nowadays are clearly at local level. The present research tries to highlight the global achievements and explore local assessment efforts on food consumption conditions. A specific region is studied, in the island of Santo Antão, one of the most important production regions. Three different production systems were compared mainly with regard to their respective influence on consumption habits, incomes and global interaction and behavior. The results show that food consumption at local level is reasonable good in terms of food security, but that food habits have a determining and surprising influence. Solutions for "food security" improvements are complex and very dependent on social systems, somehow in line with the problems in industrialized economies.

Keywords: Demand constraints, food policy, regulation, institutional innovation and economic efficiency

1 Introduction

The world continues to face old dilemmas such as how to feed (at reasonable level) everyone born in our society, but now not with the same usual constraints such as the lack of food production. It is never too much to point out that, today, there is enough food available, but hunger still persists among very

significant shares of the population. Food supply needs to continue growing, but being a necessary condition, growth will never be sufficient for assuring a well fed population worldwide[*].

Supply constraints were the main limitations for solving hunger problems in the past up to the mid 1980´s. However in the nineties (1990´s) it became clear that "Demand Factors" had to be taken into consideration, and even more, food system changes including technological changes would be driven mainly as a function of the *Demand Behavior* factors.

The actual research addresses both theoretical and conceptual matters as well as empirical research, using real examples, aiming to offer a new vision and some possible solutions. Food policy evaluation and analysis based on structural economic development discussion with models that will be proposed can help to design solutions to achieve a better food system, where hunger will no longer be present and/or will be, at least significantly, diminished at a very low and marginal level.

The paper explores previous research efforts and uses one recent example with regard to one country, Cape Verde, which is a very special case with great success at global level. The country is an important example of very difficult conditions in production, where the present challenge is clearly at local level. Taking advantage of the ongoing research, the discussion about three different production systems with regard to consumption in one of the most promising production regions (Ribeira Grande area in the island of S. Antão) will provide good insights for future policy initiatives and may raise questions for future research.

2. Background and Literature Review

Efficiency concerns raise *crucial questions* and define a key issue for technical approaches for the study of the food system. Indeed, the economic problem, in a very synthetic way, can be considered to exist in a *dual form*. One is considering how much can be produced, with the resources and technology available, and made available for consumption, and the other how to affect and provide people access to production in a sustainable way for consumption. However, this view can be seen as an old fashioned perspective, moving from production to consumption, with the *dual model* separating questions and problems, dealing with those issues on a separate basis. It seems useful and necessary today to have a more integrated perspective, even because production cannot be seen separated from consumption choices.

The World moved from a supply driven economy, in which consumption choices were clearly dependent from available products and shaped with those available choices, to a world somehow *abundant* in supply capacity. Production choices are now much more dependent from consumption preferences, and the *trigger* in economic action is now made possible starting with demand preferences and respective consumer choices. Freedom to choose was improved in many economic sectors, and certainly in the food system there are many good examples where huge improvements were obtained. However, the process is not linear, and the interactions are complex. It is evident, that in industrialized food products there is great innovation, variety and variability in time, form and space for commercialization, which provides as much diversity as never before considerably increasing consumer choices. At the same time, improvements in technology and requirements in efficiency, such as economies of scale and dimension, have limited enormously the number of crops that are now the base of our diets. That is, the world is now dependent and focused on the use of a very small number of crops, and biodiversity on that regard, did not improve.

Beyond this sustainability concerns related to the food system, demand behavior is now crucial and every "Manager" wants to discover the best way to answer to "people wants" and believes is and much less frequently able to shape this *demand behavior*. Anyway, even when this influence is possible (of course the *best of the worlds* for food managers) the basis is always referred to improving welfare and *utility* for consumers. Consumer welfare and a high utility level for consumers is the last aim for any production system.

Given the normal constraints for a diversified bibliography of referential notes and discussion, we introduce a representative statement from Graziano da Silva (2013) with the introductory comments of the FAO annual report (2013), The State of Food and Agriculture: "Commercialization and specialization in

[*] In various publications (a.o. in Carvalho, 2013) and based primarily on FAO data, the author elaborated on the "paradox" in the food system (mainly after the mid 1990s) where production is growing much faster than the population while hunger rates of population persist and are not decreasing as much as expected. FAO (2013) In the celebration of the "Food World Day" (16th of October 2013), FAO already assumed as one of the most important and clear messages: "More Production is Good, But not Enough"….

agricultural production, processing and retailing have enhanced efficiency throughout the food system and increased the year round availability and affordability of a diverse range of foods for most consumers in the world. At the same time, concerns are mounting about sustainability of current consumption and production patterns, and their implications for nutritional outcomes. Food systems must ensure that all people have access to a diverse range of nutritious foods and to the knowledge and information they need to make healthy choices."

3 Referential Models and Concepts

Models are always simplifications from reality. Sometimes they turn out to be very complex and losing some of the appealing purposes of modeling which is to make more perceptive and clear the most important interactions among diverse factors and variables. Highlighting the rationale behind processes and changes in the system is also a desirable outcome.

To understand the *mega trends* in the food system with the development processes and its relation with food security, a very intuitive but simultaneously very complete model (allowing complexity if necessary) was introduced (Carvalho 2013, 2011): *The World Food Security Equation – WFSE*. This model was based on some classics such as Hayami and Ruttan (1985) and Johnston and Mellor (1984) and also based on the author's previous work (Carvalho 1982, 1989). Dealing with demand constraints and also with technical and technological changes over time within a *general equilibrium model* developed more recently (Carvalho 2004, 2006), a conceptualization around the induced economic rational, the so called ICI model – Induced Changes and Innovation Model is explored.

Indeed it is possible to look at the food system changes based on a *general equilibrium model* (ICI model) and/or look at the changes from a more structural perspective by looking at the *mega trends* with the WFSE. In fact, in this paper, the author uses both approaches, and an effort is made to merge the rationale behind both models. There is a structural view with the WFSE (to understand the changes over time and the actual situation with regard to food security in a certain region), and, at the same time, the induced perspective model (ICI) is used to understand changes in a specific context focused on a *demand constraints* rationale.

Demand constraints are defined as the physical and/or economic binding factors which define the limits for consumption in a feasible and sustainable environment.

Supply constraint factors are discussed within a conceptual perspective frequently used in *production economics* theory, meaning the frontier of production possibilities given a certain level of technological capabilities, inputs and resources. In an autarky economy (no trade allowed) consumption constraints are equal to supply constraints, since trade is not allowed. This corresponds to the most immediate *absolute* demand constraints, but the world is somewhat more complex and it is necessary to consider other alternatives. To better include those other alternatives it is useful to consider the following definitions:

a) *Absolute Demand Constraints* can be defined as the consumption possibilities inside the frontier of possibilities of production, and inside the frontier of consumption possibilities, which are equal in isolation, but different with trade. However they should be sustainable in time, space and mode of consumption which will include also the binding physical needs that are necessary to fulfill human desire for consumption, again in a sustainable and healthy environment.
b) *Relative Demand Constraints* are defined as the set of factors that can avoid social effective demand to reach the consumption level related to the existing potential demand (preferences), given the availability of resources, technology and knowledge for a given society in a sustainable development process. In other words, given a certain potential consumption set of choices, with a given resource base, technological and production capacity, demand constraints will not allow the solution within the consumption set to be on the frontier of the possibilities of production/consumption (meaning that inefficiencies exist and can be removed and/or worked out to avoid binding solutions).

Note that the second type of demand constraints, the relative ones and other possible considerations about it, fits very well when we want to look at the *two steps* world – consumption and production considered separately. However a *new demand* perspective for a more global and integrated view (linking production to consumption, with production including consumption activities), also fits in the rationale, meaning that, "what we want is a maximization of utility and welfare" and production is now defined as any activity that uses more than one input aiming to obtain an outcome (utility), tangible or intangible, with present and/or future value, indeed a value creation process, turning consumption into a utility production process.

This value creation process works within a choice of activities, and consumption can be seen as the last chain in the *production* process in which the consumer starts with some elements, uses some *technology* and ends up with utility. Consumption efficiency considerations are now much more evident as an *economic issue* with potential great interest. Overall, the objective for any economic activity can be described globally as:

$$\text{Max} \sum_{i=1\ldots\ldots m \text{ persons}} Ui = Ui\,(y1 \ldots\ldots\ldots yn,\ Ri)$$

with y: goods 1…n

R: income

However, the most frequent analytic tools do not consider that Ri (receipts-income) can also be a dependent variable, very much resulting from choices, at individual level but also at collective level. This remark is very important in a family based economy at first stages of development where self-consumption is very present in the food system. Markets tend to be very weak and sometimes inexistent, and, on the other side, any production improvements tend to have immediate impact on consumption. Whenever economies move forward, the food system is the first to face *demand constraints*, that is people, in a family based economy, are not producing much more than they need or use (and are able to consume), and when production capacity (and technology) improves they are forced to rely on the markets which, much of the time, work very poorly. On the other extreme, at very high income level economies, people achieve a position where income is no longer a significant variable affecting consumption choice in many products (starting with food items). Engler´s law is very well known for most food products. For example, for meat, milk, cereals and so on, people consumption level reaches a *saturation level* with high income in many industrialized economies, and start decreasing consumption with income improvements.

Under this scenario, in high income economies, consumption behavior and respective choices start showing some *new demands* related with new characteristics and some factors related with *the intrinsic value of the product* with the mode of using and utilizing the product and other non-tangible variables or factors such as *social leverage* and others associated with ludic/artistic/cultural aspects of life.

The "Time Factor" is now also on the rise as a *consumption constraint*, sometimes much more important than income in the utility function for consumers, being a finite resource, a natural, non renewable resource for anyone. *Value of Time* becomes indeed a dependent and independent variable in consumption choices, which should be related with *quality of life* to solve the multi-dimensional equation system aiming to maximize welfare and well being, for each of us in the society. The relationship between income availability and *free time* turns out to be negatively correlated in most cases and societies, and even evident for families, most of the time, meaning more money in the budget but less time available.

On the other side, however, economic development has implied almost a straight forward relationship with more choices for consumption and definitely more *value for time*. What seems relevant to note is to understand that human needs are not only related with tangible goods and consumption needs but also with intangible goods, such as *free time* to choose and to enjoy other cultural dimensions of the human existence.

To conclude, the actual article introduced the discussion about economic efficiency, starting with an overview about consumption economics as the main focus to solve hunger problems today. The arguments follow from theory and previous research efforts. The next part of the research will be based on empirical results with a country case study: Cape Verde. In this case not only institutional innovation was studied, but also market efficiency questioned and tested, where a clear success has been achieved in macroeconomic terms. With the challenge ahead, *how to make the difference in local terms* to improve local welfare and food security of the families, a specific region is also analyzed looking at human behavior in food consumption and welfare with regard to food security.

4 Cape Verde: A Case Study for Global and Local Challenges in Food Security

Cape Verde is a middle income country, changing its status very recently, from the most common classification for African Countries, as belonging to the less developed world. It is an African country, located in the middle of the Atlantic in front of Africa, about 500 km from the cost of Senegal and Mauritania (around latitude 15º North, and longitude 18º W). The country achievements represented a significant step forward, considering how poor the country is regarding its natural resource basic endowments, its geographic localization and historical background. One of the most important areas of

success is the food system achievements, solving at macro level the traditional dilemma of lack of food, the expected result for countries at similar income level, but even more significantly, for countries without any conditions for local food production in competitive terms.

Cape Verde is an archipelago, with 4 033 Km^2 and 10 islands, with 9 inhabited islands with a total of 491 875 persons in 2010 (ANSA -Food Security Yearbook, 2012). Its natural conditions for agricultural production can be characterized starting with the availability of soils for production, which are not bigger than 40 thousand ha, and referring to edaphoclimatic conditions which involve limits in rain fall conditions (with a rain fall average of around 200 mm, very much concentrated in two months). In some islands there is frequently no rain at all several years in a row, such as Sal and Boavista.

Cape Verde is dependent upon imports to achieve the basic food needs (availability for food consumption). This situation is structural, but needs to be managed aiming to improve the *food security status* of the country. Taking into consideration previous work of the author, for example Carvalho (2013, 2011) and the United Nations (1996) concepts, food security means availability and access, in physical and economic terms, to enough and healthy food intake adequate to achieve a good nutritious status in a continuous and permanent path in time and space. Five dimensions are considered, as the main set of factors to be considered in studying food security:

a) Food availability;
b) Access to food – including logistics, transformation, conservation and so on;
c) Utilization and consumption – including all variables related to food quality and nutritious values, but also all variables related to food consumption choices, such as education, habits and cultural background, etc.
d) Stability of the previous variables considered (and also stability on risks and uncertainty factors);
e) Vulnerability of the system (including the resistance and resilience to external and internal shocks to the system).

Hunger is still a global problem in the sense that it is present in less developed countries but also in industrialized ones. Today it is important to introduce a more complete concept and start dealing with malnutrition problems, since the world is moving from a situation of lack of food to a situation of food surplus (excess production), in terms of availability, but also in terms of consumption possibilities. The evidence shows that many health problems today are food dependent and/or co-related with habits and consumption decisions. This situation, very much recognized in high income countries is already present with great impact in intermediate stages of development, such as the presence of obesity. However, the present focus of the research is to look to the traditional aspects of "the food security equation" for Cape Verde, meaning availability and consumption access.

Given the country characteristics, Cape Verde will tend to be dependent from food imports. However local production is much more relevant then it is perceived much of the time.

In general, food problems can be explained due to a systemic malfunctioning economy. In the industrialized countries it is basically a *micro-economic problem* linked with *social diseases*, family vulnerability, marginalization in the market place and lack of social/institutional organizations to answer to the needs; for less developed countries, it is a macro and micro problem, which is a global and local challenge (Carvalho, 2013). For Cape Verde, at macro-economic level, a set of interventions were performed, dealing mainly with *regulatory innovation* and institutional innovation. The results were very impressive, and *solved* the problems in most basic dimensions. For local purposes the challenges are still far away from a sustainable and adequate solution and are much more evident.

4.1 ANSA Intervention and Global Results

The Food Security Agency, ANSA (Agência Nacional de Segurança Alimentar) was a new regulatory agency created in 2002, with the objective to regulate and guarantee the access and availability of basic food items all over the country.

In 2013, ANSA was integrated with another agency (ARFA – Agencia de Regulação de Produtos Farmaceuticos e Alimentares), created later for providing services related to food quality control as well as to medical and pharmaceutical supervision. The name chosen for the integrated agency was ARFA (from the second one), but all the previous functions of ANSA are maintained within the new structure.

In a very simplistic way, one can say that food security and food safety matters are now under the same institutional responsibility. However, the most relevant activity in the first decade of the XXI century was

performed by ANSA and the focus of the present analysis will be the innovative actions in regulations and institutional matters on those grounds for the period up to 2010.

Food availability has been permanently a big concern all over the last five hundred years of Cape Verde's existence. Many times, hundreds and even thousands of people died from hunger because of climate variations and production failures. For example, Lopes (2010) in an historical perspective points out some of those numbers. In the period 1862-67 there was a great disaster in food production, the region losing about 29 thousand persons from hunger (with a total population around 90 thousand). The latest big crisis happened during the second World War period, and immediately afterwards in 1946, related to the isolation of the region, with losses of around 15% of the population. After that, improvements in the logistics and some kind of regulation provided outside food supply and better management, avoiding human losses such as in the crisis of 1959-60, and again in 1968 (a great drought happened again). This last crisis happened already without any references to human losses. In 1957, the local government created an institutional structure to follow imports and exports, providing discipline and rules to the market, such as following the prices, the commercialization margins, information and ability to guarantee the functions of the market.

With the independence in 1975, Cape Verde officials concerns regarding food availability was very much present, and was somehow influencing the overall political options. The political leader at that time, Amilcar Lopes Cabral (agricultural engineer), fighting for the independence globally in Africa, ended up linking Guiné-Bissau to Cape Verde. The political movements for independence, which provided this connection between main land in Occidental Africa – Guiné-Bissau and the archipelago Cape Verde, was certainly motivated also by the fact that the sustainability of Cape Verde in economic, but basically in food terms, would be very difficult or almost impossible to reach in physical terms.

At this point, it is important to keep in mind, that Cape Verde should be one of the most important cases where food problems have been so relevant and with direct impact in its history. It is certainly in the world one of the countries where people really are concerned with food availability and access for consumption, (and this can be perceived in human behavior). With independence one of the most important measures and structures created was a Public Enterprise – EMPA – Empresa Publica de Abastecimento. This enterprise, with a monopoly in the distribution of basic food stuffs among all regions and islands in the country, ended up working reasonably well, and provided a public service selling its products without any market competition.

At the end of the 1980´s the discussions about a more market oriented and less centralized economy began, very much mobilized after the fall of the "Berlin Wall" in 1989. During the next decade in the 1990´s, several measures were taken, providing less State and Government intervention and more citizen space for economic activities, including food distribution.

The World Bank at the end of the 1990´s ended up promoting the discussion about changing the monopoly structure of EMPA, and about how to provide incentives to a free market oriented food system. Several studies where done, and one of those was a World Bank Study, led by the author of this paper.

To make a long story short, as a result of the World Bank project the model of ANSA was created and later implemented in August 2002. Indeed, some basic principles where put in place. The agency would be:

a) very much focused on the basic food product markets (seven products),

b) will avoid, as much as possible, any direct intervention in the market place,

c) will act as an "intelligence unit" providing the best information possible to all actors in the system and markets,

d) will promote fair competition and fight against any "rent seeking" activities,

e) will promote information transparency and fight against any asymmetric information tendencies in the system,

f) will support the efficiency of the local " market players",

g) will make international information less costly and available to the internal market players,

h) will maintained a good and precise information about storage and the availability of market products, and

i) finally, will study demand behavior, prices and consumer attitudes (and consumption in the different markets), at central but also marginal markets, keeping track of the logistics problems and commercialization margins.

One of the important instruments of ANSA was the food aid received and used to stimulate markets and competitive attitudes. Another important characteristic of the agency was its structure which was completely independent from direct interventions by government and its financial autonomy from the government budget. The responsibility to introduce norms and rules in those specific markets were also part of the ANSA mandate, but the most significant perspective can be stated in a few words: the ANSA mandate involved the responsibility to regulate on those specific markets where regulations meant actions to promote more market oriented activities, with the lowest possible burden in bureaucracy and less direct state intervention, providing stability and regular expectations.

4.2 Main Results

Many available data can be used to show and support the conclusion that good results have been reached, such as price levels, price stability, storage guarantees based on private actions (not public storage), and comparative behavior among local markets and international markets.

The first challenge was to compare the price levels of the basic food products in the market place with and without EMPA, (meaning after EMPA was shut down and no more direct public intervention in the system appeared). These comparisons were done and published at several occasions, showing how ANSA intervention allowed markets to perform making clear that average price levels in 2005-2006 in relation to the previous period with EMPA, up to 2002, were more or less 3 to 5% below in absolute terms. Those results mean that relative savings were estimated to be between 5 to 10% for consumers between 2002 and 2005/6. It is not necessary to explain how important those facts were and still are for poor people.

Let´s look now to the storage guarantees of the system, based on private operators, “vis a vis” the public enterprise – EMPA, which maintained a storage level of around 3 months of consumption as operational reference. The data in table 1 below are calculated based on the ratio of storage quantities to consumption per month with the final column displaying the average number of months of consumption available in the country.

Table 1.
Average Stock – measured in terms of months for consumption

Ratio – Storage/consumption=average months available for consumption							
(Values in Months for consumption)	Year						Annual
	2006	2007	2008	2009	2010	2011	Average
1. Cereals	8,70	11,00	9,95	9,19	9,29	8,09	9,4
» Corn	9,11	14,95	17,62	15,19	15,63	16,98	14,9
» Rice	14,44	15,74	11,36	16,31	17,23	13,75	14,8
» Wheat				9,98	7,85	11,76	9,9
» Wheat flour				3,51	1,98	0,46	2,0
2. Sugar	13,17	16,11	14,47	15,24	12,49	16,11	14,6

Source: ANSA - data base on the main operators responsible for 80% of the cereal markets (2004 to 2011) and more than 75% of the market for sugar in the last 3 years in “Anuário de Seg. Alimentar de Cabo Verde 2010-11.”

The data in table 1 are impressive, showing around 10 months of consumption guaranteed in the country, which leaves any concern about needs for storage by the public services irrelevant. The private sector is providing not only a very save margin, but a relatively stable one and very much above any previous records.

Let´s look now to the behavior of the internal markets for Cape Verde, with the ANSA regulatory performance “vis a vis“ international markets performance.

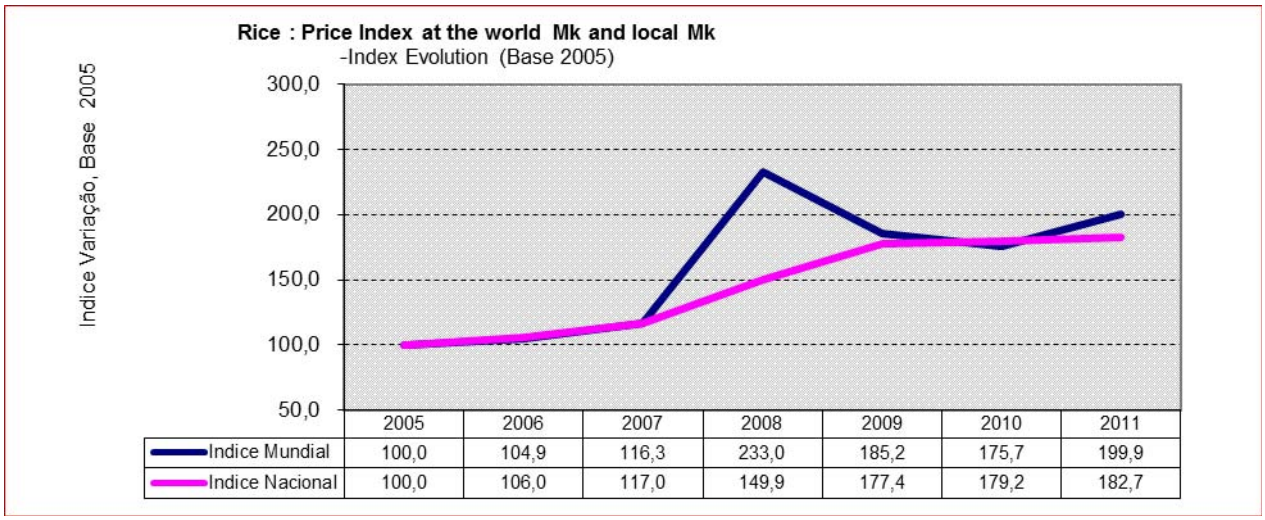

Figure1. Price Index comparison for rice, international market (blue line) and local index (red/pink line). Source: ANSA (2013). Food Security Yearbook.

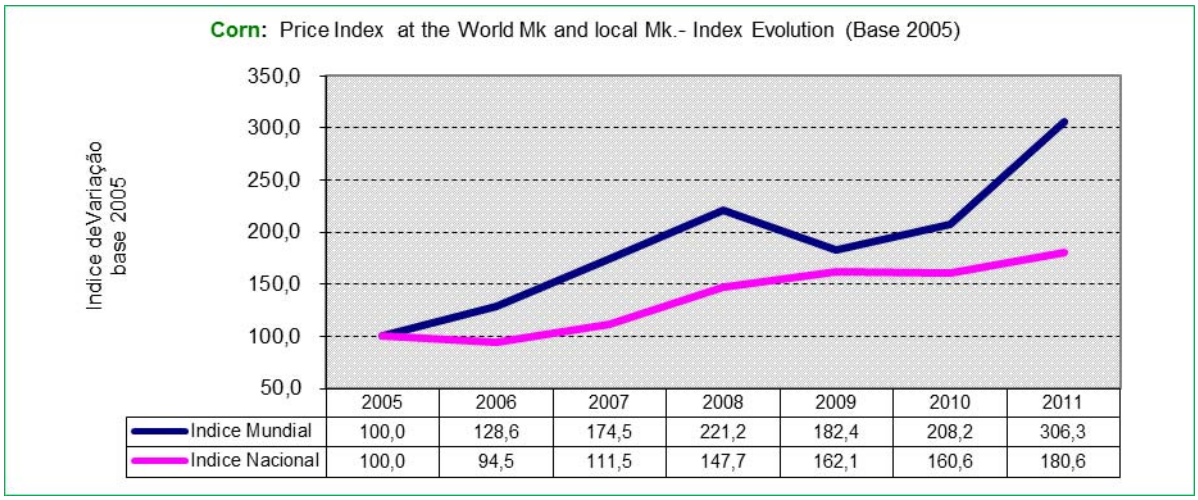

Figure 2. Price Index comparison for corn, international market (blue line) and local index (red/pink line). Source: ANSA (2013). Food Security Yearbook.

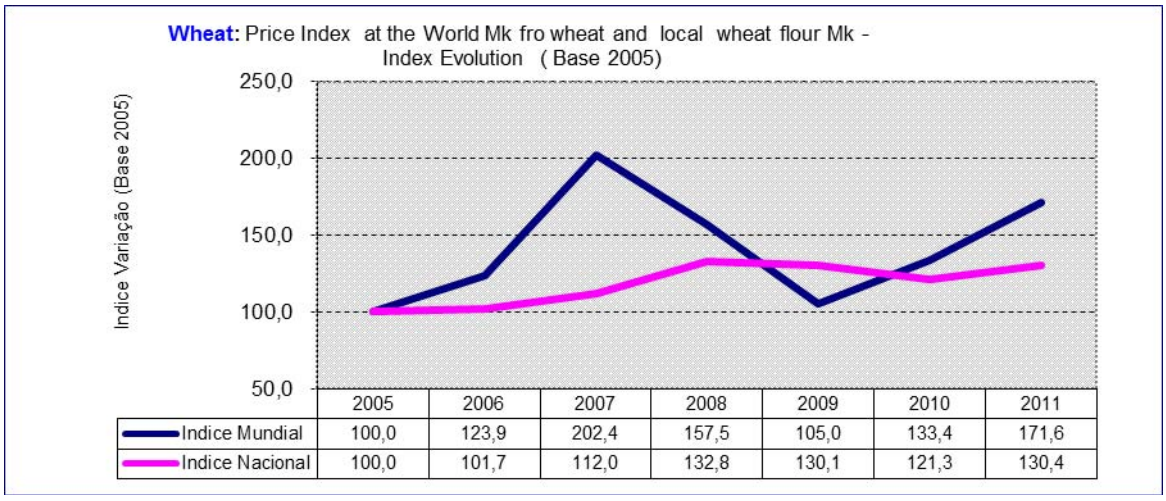

Figure3. Price Index comparison for wheat, international market (blue line) and local index (red/pink line). Source: ANSA (2013). Food Security Yearbook.

The data for the 3 main basic food products (rice, corn and wheat) show that internal markets for Cape Verde have been more stable and very much in favor of consumers. Many other data can be presented, but it is possible to say, that in general it is obvious that basic food markets in Cape Verde behaved very efficiently, and definitely providing consumers with *good and efficient markets*.

The conclusions are very impressive, in the sense that a food system very weak in production capacity, performed overall very well and pro-poor (a clear paradox situation for the system), deserving attention. That is, a new institutional arrangement, the creation of ANSA and its implementation was able to show impressive results. More *regulation* in the food system ended up being *more market economy* while providing better markets in the food system and not less markets and less freedom to choose. Beyond that, globally, the Food Security Equation for the country at macro level seems to be *well solved*.

4.3 Local study – Interfaces of food production systems with food consumption.

The huge challenge ahead is now how to assure that those results will have full impact at local level, at local markets, but also moving ahead in social terms, looking at consumption behavior, health conditions, quality of life and so on. However, on food security grounds specifically, the research needs will have to clearly look at what can be done to improve the nutrition status and well being in food consumption.

Several studies have been performed in our research team at CIAT – Center for Research on Tropical Agriculture at the University of Lisbon, as recorded by Manuel Monteiro (2012). Table 2 below builds on the studies and provides the most recent information about consumption habits in the country, regarding the necessary information for evaluating the nutritional status.

Table 2.
Caloric consumption, protein and fat consumption for different samples in different places in Cape Verde and on different years.

Local		Calories (kcal/EH/dia)	Protein (g/EH/dia)	Fat (g/EH/dia)	Obs.
Ribeira Grande		2925,07	97,47	114,84	Monteiro(2012)
Praia (Santiago)		2404,00	64,00	21,00	Silva (2005)
Picos (Santiago)		2979,72	90,05	110,00	Costa (2008)
São Filipe (Fogo)	**Horticulture**	3379,00	116,20	91,70	Silva (2009)
	Non Horticulture	3130,00	92,50	76,00	

Source: Carvalho et al (2013) based on data from Monteiro (2012) .

The study by Monteiro (2012) will be explored in more detail and will be used to provide the basic arguments for the following discussion. From the study some indications can be derived along with other references and knowledge about the real world and its evolution in Cape Verde. In general they support the conclusion that there are global improvements in food consumption quantities, achieving good global levels in caloric intake and also in proteins and fat consumption.

The nutritional problems today in Cape Verde are similar to the problems in most developed countries. Obesity is already a problem, mainly in lower income groups and in *transitional* families changing very fast from being very poor to medium class, and from rural to urban habits. Manuel Monteiro's (2012) efforts are based on CIAT research methods and deal with trying to look and identify linkages among dominant production systems and consumption differences.

The research about food production systems and its interaction with food consumption is indicative, based on a sample of 105 households with 35 focus elements for each of three production systems dealing with horticulture, dry production, and sugar cane dominant production. The study was conducted in Ribeira Grande in the island of Santo Antão, one of the best production areas in the country.

Table 3.
Calories (kcal), protein (g) and fat (g) intake, per person – adult equivalent, for different households in different production systems.

Hortículture			Sequeiro-"Dry Farming"			Sugar-Cane			Total General Average		
Calories	Proteíns	Fat	Calories	Proteins	Fat	Calories	Proteins	Fat	Calories	Proteins	Fat
Kcal/EH/d	g/EH/d	g/EH/d	Kcal/EH/d	g/EH/d	g/EH/d	Kcal/EH/d	g/EH/d	g/EH/d	Kcal/EH/d	g/EH/d	g/EH/d
2959,71	103,12	115,81	2926,65	97,23	117,92	2888,86	92,05	110,81	2925,07	97,47	114,84

Source: Monteiro (2012).

Table 3 data shows a summary of the results obtained. Data provided the information to conclude that all groups are very similar in consumption, and differences are not significant between those groups. However, differences in income and in the use of production for self-consumption are very important, as can be seen in table 4 below.

Table 4.
Total Income inferences per year and values for self-consumption in ECV $.

	Horticulture	Dry Farming"	Sugar-Cane
Total Income	378088	286962	420632
Self-Consumption	40486	27198	18478
Total income - without self-consumption	337602	259764	402154

Source: Monteiro (2012) and author estimations

Some comments are necessary to better understand those results. First, it is important to understand that income from agriculture activities for the households studied in Ribeira Grande, S. Antão Island County, is clearly complementary to other sources. However differences in income levels are significant and mainly dependent on the agricultural activities and returns. Average salaries account for about 200 thousand ECV$ (differences are not significant).

The results are very astonishing since income does not seem to have significant impact on consumption, with diets that are very similar. Higher income seems to indicate poor food intake, and lower food production, very much related to the production systems (sugar-cane production). Food habits have an important and significant presence across all families and differences are not significant based on income differences. However local food production relevance seems to have a positive effect on consumption, mainly in the horticulture systems.

5 Concluding Remarks

Globally it was demonstrated that Cape Verde is an important example of institutional innovation with great success in dealing with the country macro-economic problems regarding food security concerns, risks and uncertainties.

At local level the challenges are very present, and somehow, similar to what we can find in more industrialized economies. The *welfare equation* and maximization process can turn any production activity in an intermediary stage to the final stage of producing *utility* to the consumer, and at the same time, consumers need to assume that the usual income constraint can be transformed also on one dependent variable of their choice. That is, income can also be, up to a certain level, a variable to be included in the consumer's choice set. Policy makers and governmental officials need to consider that social responsibility is there forcing the construction and/or offering alternatives to the consumer to build their own choices to reach a certain income level and quality of live standards.

The local case study was important to demonstrate that people *are constrained*, but many times not only for income, but given the local conditions and cultural background, they do not change easily unless focused actions are taken.

Income is not necessarily the most significant factor for changing and/or influencing consumer habits. Overall the intake values in food consumption are already at very good levels, and there is no indication of hunger problems and malnutrition. However it seems clear that education to improve food habits can,

and should be an important issue to be considered for improving the local welfare of people. Income should be studied along with other variables with relevance for defining the quality of life standards. New demands need to be well understood for policy makers to make positive contributions to the overall situation. Market functions and demand constraints seems to play an important role, in terms of allowing (or not) raising incomes to the family, through production activities, but within the actual production system choices, sugar-cane production systems are clearly the best alternative for improving the income level of the local households.

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