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Full Length Research Paper

Analytical model for the global consumption of tomatoes- The Spanish case

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This article presents the current situation of tomato consumption worldwide. This paper proposes a new methodology for classifying countries into four main markets, 'the sustainable market', the 'effort market', the 'vulnerable market' and 'the declining market'. Each market has its own producing and consumption trends and its particular strategies for producing, exporting, distributing and logistics strategies. Finally, this paper identifies the most influential variables in the commercial process of producing, consuming and exporting of Spanish tomato.

Key words: Trade, vegetables, sustainable market, vulnerable market, declining market, effort market.

INTRODUCTION

Since Smith's (1956) introduction of market segmentation, marketing practitioners and academics have adopted the concept enthusiastically, and standard marketing texts now include at least a chapter describing segmentation and the benefits it will bring to marketers who adopt the technique (Hoek et al., 1996: 25). "Market segmentation is, according to many authors, one of the fundamental principles of modern marketing" (Dibb and Stern, 1995: 625). In literature there are a lot of definitions of market segmentation but most of the authors agree that segmentation is the breaking up of a large usually heterogeneous group into smaller market groups that is, segments that respond to a particular marketing mix in a similar way (Kovacic et al., 2002). Kotler (1988) pointed out that some of the advantages of the segmentation are:

i) A full understanding of a market.
ii) The ability to predict behaviour accurately.
iii) An increased likelihood of detecting and exploiting new market opportunities.

The segmentation can help businesses allocate financial and other resources more effectively (McDonald and Dunbar, 2004: 16). It is also suggested that it leads to a better understanding of customers which can assist in the design of more suitable marketing programmes (Dibb et al., 2002). The purpose of market segmentation is to identify the taxonomy of consumption patterns by dividing a market into several homogeneous sub-markets. Marketers can formulate product strategies, or product positions, tailored specifically to the demands of these homogeneous sub-markets. Homogeneous sub-markets are defined by predetermined segmentation variables (Lin, 2002: 249). The main objective of this paper is to analyse the global trend in consumption of tomato in the most important consumer and producer markets as well as to figure out what is happening in one of the main markets of Spain's exports. For this purpose, the Agri-food Consumption Analysis Model (ACAM) is applied.

We have to keep in mind that the trend of Development and Cooperation of European Union policies towards the countries of 'the Mediterranean Basin' is aimed to open markets. As evidence of this, it has been the establishment of a Free Trade Area in 2010 for these countries that begins with Morocco for certain sectors and it will

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extend to other sectors and countries little by little. The most advanced country in these relationships is Turkey that has customs union with EU since 1996. In July 2011, it is being discussed in EU Parliament, the approval of the agricultural chapter in the FTA with Morocco. This will bring greater competitiveness of tomatoes from Morocco in the short term and medium term and from other countries that produce in Mediterranean Basin (Tunisia, Egypt, Turkey…). It is, therefore, essential to know the trend of the consumer markets of the EU and see what markets are now interesting and what are potentials. We take the Spanish case as reference because it is the leader in its tomato exports to European Union, and it is the maximum competitor from Mediterranean Basin products. Currently, there is only intense competition in France, where Morocco is the first exporter of tomato followed by Spain. In the rest of the countries, Spain occupies a privileged position. The article make clear that it acknowledges an increase in the consumption of tomatoes in many European countries (Spain is the eighth tomato producer in the world and the main supplier of fresh tomato in the European Union), while experts in Brussels says that it's stagnant, the latter is under the influence of volume traded in Italy and Spain. Here, it is worth extending the comment, clearing the case of consumption in Italy and Spain in the overall data, there is a new "consumption map" with different tendencies. According to ACAM methodology, there are many countries that place inside sustainable market, some of them in effort and vulnerable markets, and lesser extent, in declining market. According to this model, market consumption has been divided in four based on their annual rate of change. Countries rated with a "sustainable" market have experienced an increase in tomato consumption and other vegetables. By opposition countries in the "tough" market have experienced a rise in tomato consumption and have experienced a reduction in the consumption of other vegetables. Countries in "vulnerable" markets have shown a decrease in the consumption of all other vegetables. "Declining" markets show a clear decreasing trend in the consumption of tomato as well as in all other vegetables.

As a matter of fact this paper is organized in four sections; after this section it will introduce an explanation of the methodology used by the Agro-Food Consumption Analysis Model. Thirdly, it contains the description of the global results and results for Spain. And a conclusion ended this article.

METHODOLOGY

The proposed agro-food consumption analysis model (ACAM) helps to understand the tomato market classification and allows us to visualize the current situation (Giacinti, 2001b: 42). The purpose of the model is to establish the position of different countries in a graphic that will allow us to classify them according to internal consumption, production and global distribution strategies.

The paper uses de ACAM methodology for "segmenting" the trend in consumption, the reason why is not a statistical study of methodology or consumption data, but rather, a method to clarify the situation of whether or not the consumption in Europe is stagnated or has a different dynamic, the latter was something that it was founded. ACAM model is a visualization tool for the segmentation of food consumption. In a wide sense, the ACAM model contributes to the strategic global food consumption analysis, especially for cluster or export-related sectors. On the other hand, the model shows that the consumption of food does not tend to a single market or global in recent years, differing from other sectors that tend to globalize as the capital market, manufacturing or assembly plants and communications. The ACAM model also pinpoints the annual growth rate and the effective rate of tomato consumption, this rate results from the consideration of the data trend slope calculated from a regression linear function. After this operation, a matrix of accumulated growth rates, both positive and negative is developed which permits us to classify markets into four distinct groups that will ensure the concept of modeling analysis (Giacinti, 2001b: 42).

Firstly, it must specify the annual growth rate of food consumption records under study, calculating the effective rate by the slope of the linear fit. In this sense, it calculates the "trend" and then the rate of "growth" to finally make the model matrix, as follows:

Phase 1

"Trend"

It is the visual or mathematical interpolation of a standard line (in this case a straight line) showing the direction of the values (Y). The trend is represented by the letter "a" and is calculated using the following formula:

$$a = \frac{n\,(\Sigma XY) - \Sigma X\,(\Sigma Y)}{n\,(\Sigma X^2) - \Sigma X\,(\Sigma Y)}$$

Phase 2

"Growth"

It is an increase percentage (positive trend) or decreased percentage (negative trend) base on the average of the actual values studied and represented by the letter "b". This model represents the growth rate percentage of consumption of a particular food or the generic basket of the same product, over the consumption average in the analyzed period:

$$b = \frac{a\,(n)}{(\Sigma Y)}$$

Phase 3

"Model"

Finally, it produces an annual growth rates matrix of different analyzed markets (positive and negative) which allows a

Table 1. Annual growth rates matrix of different analyzed markets (positive and negative).

Market	Consumption decrease (specific fruit -%)	Consumption growth (specific fruit +%)
Other fruits (consumption growth +%)	Effort of tough	Sustainable
Other fruits (consumption decrease -%)	Declining	Vulnerable

classification into four different groups, which end by expressing the concept of the ACAM model (Table 1):

i) The "sustainable market" is one in which all the fruit include the specific ones are growing.
ii) The "effort market" is when the specific fruit is growing despite a contraction in consumption on fruits in general.
iii) The "vulnerable market" features for a drop in consumption of the fruit in particular, although these markets show signs of growth in the RESY of the fruits.
iv) The "declining market" is characterized by the decrease of both specific fruit and the other fruits.

The ACAM model is particularly designed to observe the current trend in segmentation of food consumption based on the annual growth rate in terms of fresh fruits (Giacinti, 2002a, 2002b), meat (Giacinti, 2001a), wine (Giacinti, 2004) and for a complete analysis (Giacinti, 2001a); nevertheless this is the first time that global research into evaluation of production areas planted with tomatoes has been done. The sustainable market section presents an increase in consumption of the food analyzed; in this case tomato and the rest of the group basket like onion, lettuce, green beans, cabbage and other vegetables. Generally, "sustainable" markets are important for building a strategic plan of penetration; in these markets it is very difficult to achieve profitability if you do not have good production costs as well as processing and marketing ones. This market is based on a strong added value. The tough market is a section where only consumption of tomato increases but not other vegetables. Among other possibilities, the "tough" markets require an efficient distribution network, a complete offer and withdrawal of new varieties, organic production and a certified origin brand name.

In the vulnerable market, tomato consumption decreases and the intake of other vegetables increases; while in a declining market the trend of tomato and other vegetables declines.

GLOBAL RESULTS

The countries analyzed in this paper represent the 80.17% of global consumption as reported by FAO and COMTRADE[1], and Figure 1 represents the results of ACAM between 2002 and 2009. The annual growth rate of tomato consumption worldwide was 3% over that period, while it was 2.4% for other vegetables. The increase in consumption in that period can be explained by increases in production (+3.4% annually) and trade (+3.9% imports) which have continued to trend up to 2007 (the latest information available in FAOSTAT). FAOSTAT data are complemented by COMTRADE information in order to develop a fresh tomato consumption series, preserves and sauce which is analyzed on tomato consumption in countries where Spain supplies (Figure 1).

This research helps as a "strategic map" to discuss the strategic factors to improve competitiveness in the export of Spanish tomato, this idea could be transferable to other countries that are in the same situation of Spain.

RESULTS FOR SPAIN

If the analysis is now limited to a sector of countries that come together with Spain and we focus the study on them, we would get the information seen (Figure 2). This graph has incorporated information on the level of sales in those countries, represented by the size of the bubble. Moreover, as important data, trends representing Morocco and Turkey have also been added representing the level of exports from countries which export to Spain through bubble size. The principal export market for Morocco is France, and for Turkey it is the Bulgarian market. Then we come to specifying the most significant details of some countries, seeing the reality of the analysis shown at the ACAM (Figure 2) consumption of Spanish tomato in red, and in blue, tomato consumption in competing countries) helps our understanding in which market type Spain fresh tomatoes are positioned. The effort markets require efficient logistics; sustainable markets; a competitive cost and vulnerable markets require enhancing the added value.

Besides, Figure 2 helps to show that Morocco is not the main obstacle for the Spanish tomato's economy, but in the media it is talked about that its importation is a problem. However, the main markets to which Spain sells its tomatoes, there is not a strong competition from Morocco that it caters France very well.

Sustainable market

Here, countries which have experienced an increase in tomato consumption have also experienced a rise in consumption of other vegetables; the relevant strategy in this quadrant is based on successful pricing throughout the whole supply chain from production to selling. Undoubtedly, a better approach for decisions based on specific consumer-segmentation approach will enable more profitability and sustainability. But the main characteristic of the 'sustainable' countries is that

[1] FAOSTAT data do not differentiate between industrial process and marketing of tomatoes. For this reason we used production data from FAOSTAT (http://faostat.fao.org) and COMTRADE data (http://comtrade.un.org) to estimate the consumption of tomatoes in fresh, sauce and tinned.

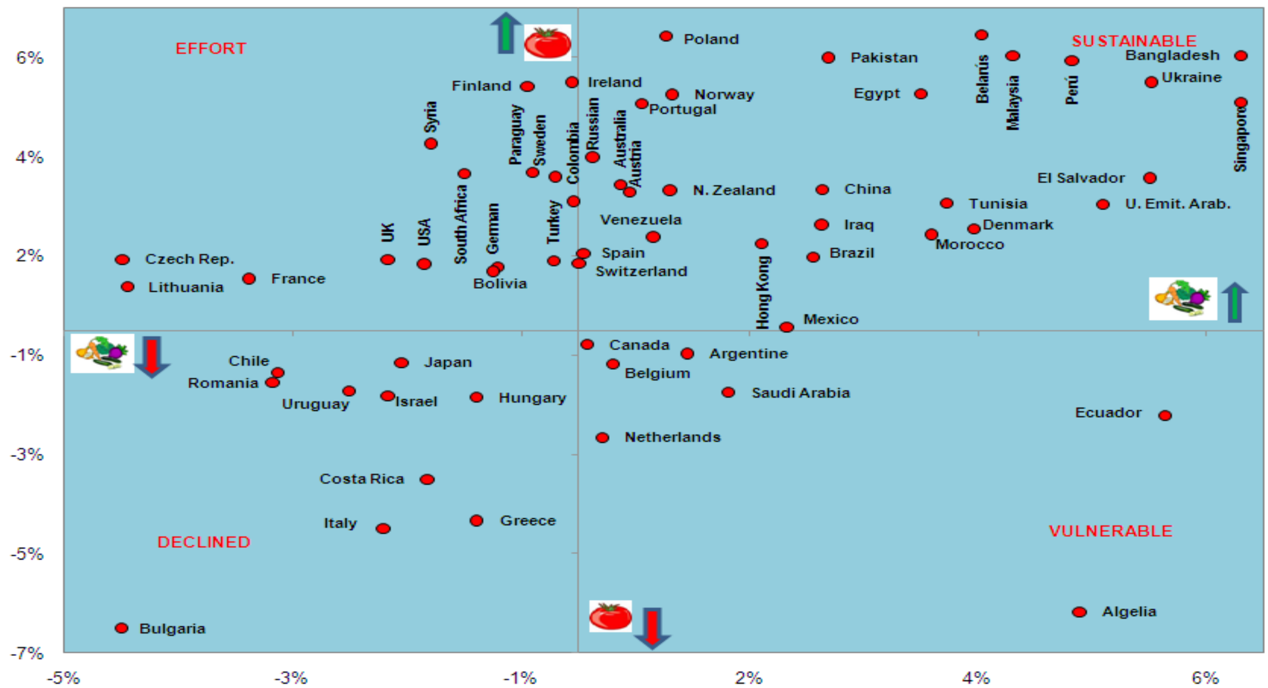

Figure 1. Change in global tomato consumption (2002 to 2009). Source: Own elaboration.

competition is more intense through the sale price and therefore through the relevance of a competitive cost. It is important to note that comparing perceived price/quality by the buyer or importer is the factor related to cost competitiveness; in general, there are differences in product supply in terms of presentation, packaging, commercial quality, varieties, etc.

Morocco

The agricultural sector in Morocco is a cornerstone of the national economy. It occupies about 40% of the active population and agricultural GDP assumes around 20% of total national GDP (ICEX, 2008a: 10). This country occupies sixteenth place in world production rankings; from 1998 to 2003 tomato production fell due to adverse weather and this had an impact on lowering consumption. However, from 2004 to 2009[2] production increased again and domestic consumption had partially recovered, although the main incentive is exports. Morocco has a lot of competition in Spain in the French market, as evidenced by the fact that about 80% of Moroccan exports are destined to France. This situation has been aggravated since trade agreements with non-EU countries; a conclusion already reached by Perez and De Pablo (2004).

Spain

This country is the ninth largest producer of tomato in the world; the average consumption is 13.69 kg per capita/year[3]. National tomato exports increased by 6.7% in volume and 5.6% in value in the last year, representing a total of 994,831 tons exported with a value of 800 million euro. The EU has received 94% of total exports from Spain, the main markets being Germany, France, England and the Netherlands[4]. By region, Valencia leads exports by volume, with 2 million tons (-2%) and 1,791 million euro (+10%), followed by Andalusia (1.8 million tones, 2.161 million euro) and Murcia (1.3 million tons, 1.222 million). FEPEX warned that the overall good performance masks the decline that is occurring in some vegetables of great importance in Spanish agriculture and in tomatoes (with a fall in export volumes up to 13% in September, 2010)[5].

Poland

More than half of Polish imports of these products are of Spanish origin, citrus (orange, lemon and tangerine),

[2] FAOSTAT. Production. (faostat.fao.org).

[3] MARM: Ministry of Environment and Rural and Marine of Spain. Data base of consumption in homes. Data 2009.

[4] FEPEX: Federación Española de Asociaciones de Productores Exportadores de Frutas, Hortalizas, Flores y Plantas Vivas. (http://www.fepex.es).

[5] ICEX. News. 26/11/2010. Source: Empresarios por el Mundo.

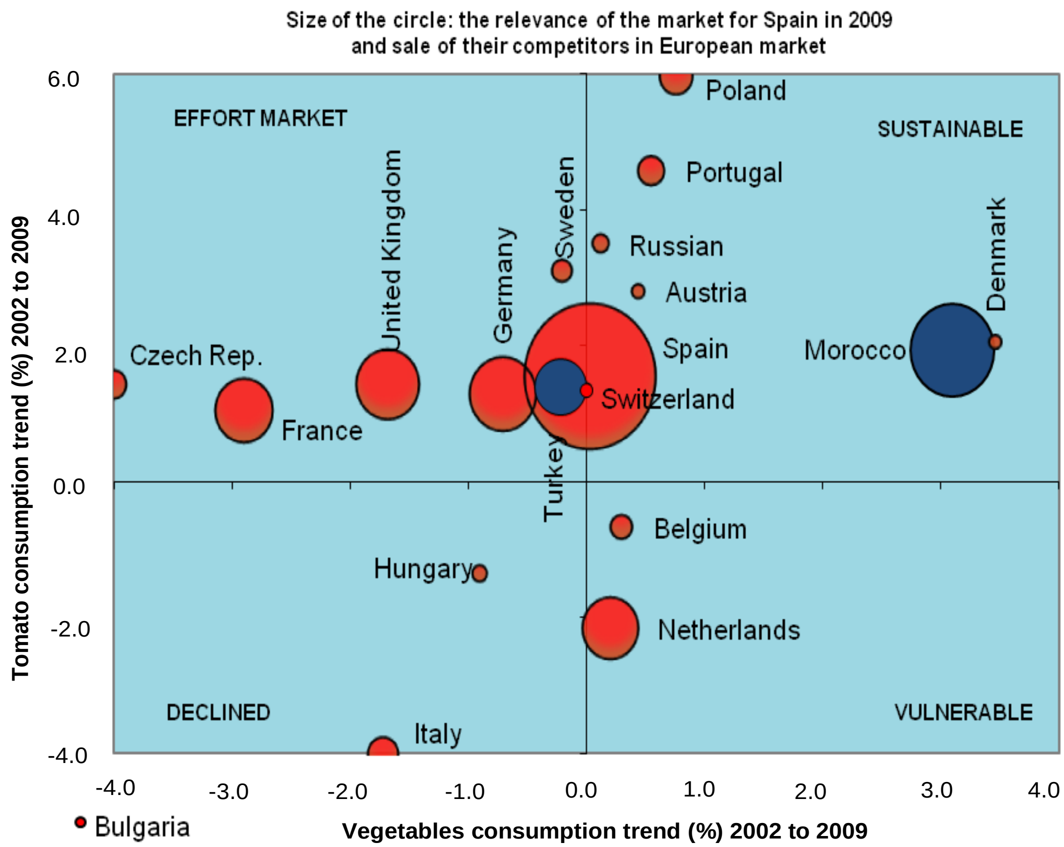

Figure 2. Change in tomato consumption (Spanish markets) (2002 to 2009). Source: Own elaboration.

other fruits (strawberries, melons and tropical fruits, among others), vegetables (tomatoes, peppers, cucumbers...) and olives; there is also a progressive wine demand. In general, Spanish food products have very good insight into the Polish market. The most negative factor is the cost of transport. Products similar to Spanish ones made in France or Italy have a wider presence because importers prefer to source from countries close by with lower transportation costs (ICEX, 2007: 15).

Denmark

Tomato is one of the products with a higher import volume in Denmark. It has experienced growth over the past three years. This is clearly reflected in Spanish tomato exports to this country, maintaining an upward trend.

Russia

This is the eleventh largest producer of tomato in the world with a production extension of 112,210 ha, its production and imports are growing every year. In the period from 2002 to 2009, production increased by 0.15% and imports by 294.41%. This growth in imports has been completely covered by Turkish tomato whose exports have grown even further (342.65%).

Effort market

This would indicate that there is an intention to consume more tomato, but not the rest of vegetables. These are usually markets where the consumer is tired of seeing the same offer of supply and this creates a particular opportunity for innovation and encourages the consumption of a new kind of tomato with more added value, a more differentiated (organic tomato) product or a particular variety. It is not a question of cost or distribution but more a matter of stimulation of consumption. In this quadrant, as well as in the declining markets, the segmentation is the most useful tool to successfully address the productive and commercial activity of tomato. It could also be the same case in countries where production decreases for climatic factors or agronomic problems and have a low economic possibility to import tomato due to a low purchasing power.

Germany

Germany drags the train as an importer of European fruit and vegetables (Pérez et al., 2003: 59, 2004). In its broad portfolio of imports are tomatoes. However, the lack of local production is very well positioned. If you do an analysis of the binomial product-country, we can see that tomatoes bought by Germany come almost exclusively from two countries: Spain (25%) and Netherlands (50%). We can also see how in recent years the Spanish tomato has been losing market share at the same level as France has won it. According to the current results of the 'food supply quantity' from 2007, average tomato consumption was 17.30 kg per capita/year, the most important among vegetables.

France

It is the twenty third tomato producer in the world with more than 4100 ha used, 90% of this production is made in greenhouses, 60% of which is used for fresh consumption and 40% for industrial consumption. This production has declined each year (-2.8%) while consumption has increased (+1%). This situation explains the increase in imports of fresh tomato (+3.3%), canned (+3.4%) and salsa (+4.1%). Spain remains the top supplier of fruits and vegetables to France and has earned an image quality among professionals for years, but Morocco continues to gain market share thanks to lower prices. In the case of tomato, Morocco exported a greater amount than Spain since 2006.

United Kingdom

This is a mature, discerning, sophisticated and diversified market, dominated by a handful of large supermarket chains which account for 75% of the market and import about 67% of fresh produce offered in its stores. However, in the last two years due to the global crisis, the United Kingdom is experiencing a decline in greenhouse production. It is now reduced to less than 100,000 tons per year and represents a target market of the most interesting for any exporter-producer due to high prices the market is willing to pay. Its main suppliers are Spain (traditionally has been a great deal of business with the Canary Islands and more recently with Almeria), the Netherlands and North African productions. The English market is clearly segmented into specialties. Within this range, grows in importance the bio sector. Raw tomatoes rose significantly by 24%, tomato type "prune" by 18.5% and cherry tomato by 14% (ICEX, 2009: 5). Consumption has grown in the range of years studied (+1.4%) which has increased imports of fresh tomato (2.9%).

Sweden

The most popular vegetables are potatoes, tomatoes and carrots, and bananas and citrus as regards fruits. However, note that consumption is still far from the figures for other European countries. The main vegetables imported from Sweden in terms of value are tomatoes, lettuce, onions and garlic. Spain is well placed in these 3 games: the first exporter in the case of lettuce, and second largest importer in the case of tomatoes and onions, though growing faster than the Netherlands, the biggest exporter (ICEX, 2008b: 4).

Austria

Production of vegetables cultivated decreased to 126 000 tons (-4%) over the previous year. Therefore, all over Austria on just 580 ha (-32%) 9 700 tons (-31% compared with 2009) of sweet corn were harvested. However, tomatoes which account for more than one third of the vegetable production recorded a slight expansion in cultivation area (+2%) and resulted in a rise of 7% to 44 200 tons. Among greenhouse crops mainly tomatoes on the vine were cultivated. The harvest yield of 32,100 tons accounted for more than 70% of the tomato production. The exports have growth of 180% in last seven years (1.400 tons) almost three times more.

Turkey

Traditionally, approximately 70% of total tomato production in Turkey is consumed fresh and the remainder is processed. Of the 30% of the crop that is processed, 85% is used to produce tomato paste, 10% is canned, and the remainder is used to produce dried tomatoes and other products. Over the period of 1995 to 2007 production increased by 2.7 million tons to almost 10 million tons in 2007. Exports increased by 300,000 tons to reach 400,000 tons in 2007. Imports are insignificant over the whole period. Tomato exports from Turkey are highly seasonal and generally take place between February and June (Gülşen et al., 2007). Turkey exported 1.023.000 tons of fresh vegetables in 2009. Tomatoes have a significant place in total exports with a share of 53%. Other principal export products of fresh vegetables in the sector include cucumbers-gherkins, peppers and onions (IGEME, 2009).

Declining market

In these markets the product offer has to be recreated and the strategy of consumer incentives should be linked to consumers tired with the actual supply. These are, generally, countries with a high per capita consumption. It can also be countries that have economic problems, affecting their ability to purchase or resulting to reduced capacity to import goods. In this case, the possibilities of recreating consumption are low or nonexistent, while in the case of a tired consumer is just a question of added value, differentiation, variety and presentation, and in some cases a question of cost and distribution.

Italy

It is the sixth largest tomato producer in the world with a surface of 115,000 planted hectares. Tomato production is 33% for fresh consumption and 67% is for industrialized, peeled (mostly for exporting) but also concentrated tomato, crushed, pulp and salsa. Until 2005 what has been observed in this country is mainly the consumption of fresh tomato, not the industrialized sort[6]. It also reflects in 2006 and 2007 migration from industrial sort to fresh tomato, but the total consumption is still stagnating. In 2009, the consumption of industrial tomato grew to nearly fresh tomato figures; it seems that the consumption of the different type of tomato is very variable (MPAAF, 2008).

Vulnerable market

The "vulnerable" market reflects decreasing tomato consumption while the consumption of other vegetables increases; this indicates that there is an intention to consume more vegetables, but not just tomatoes. They are markets where the consumer is tired of the traditional supply and would like to see some innovation to encourage a new type of tomato consumption, more differentiated (organic), with more added value or even other kind of variety, among other possibilities.

Netherlands

Netherlands has an advanced infrastructure for growing vegetables in greenhouses which are highly competitive. The quality and price of its native organic products makes it very difficult to introduce into the market for imported organic products, which also have a short expiry date (ICEX, 2006a: 4, 2006b). Tomato consumption has fallen (-2.2%) although production has increased significantly (+5.1%) and for this reason tomato exports have grown fresh (+12.7%), canned (+7.1%) and salsa (+3%). Netherlands remains a center for forwarding our product. In other words, Spanish tomatoes are imported for re-export.

Belgium

Consumption and production are down significantly since 2006. The fall in production is being overtaken by growth in exports from the Netherlands while Spain loses export share.

FINAL CONSIDERATIONS

This paper suggests that the world's tomato consumption is increasing every year as reported by FAO (2002 to 2009), and that all countries do not have the same trend, differentiating at least four types of markets. These four markets are a description of consumer segmentation based on the trend of tomato and other vegetables consumption. The current treaties that are taking place between the EU and Middle East and North Africa countries gives us an idea of the European trade liberation in the medium term and the importance for the consumer market evolution and competitiveness. All the aforementioned can be critical to the economic development of different countries. As a limit we can say that this article does not claim to give a comprehensive diagnosis of the European situation which is skewed by two important consumer countries, Italy and Spain, in this sense we can say in conclusion, according to Brussels experts in the area that tomato consumption is stable or stagnant. However, another hidden reality is that most countries in this region are in the "sustainable" market (United Kingdom, Ireland, Austria, Denmark, Finland and Sweden) and in the "tough" market (Belgium, Switzerland, Israel, Poland, Germany and Romania). Some are in the "vulnerable" market (Spain, Netherlands, Portugal and Greece) and others in the "declining" market (Italy and Bulgary). This new classification system facilitates the understanding of what is going on in the European tomato consumption, detect and even understand the movements of this relevant sector, as well as the phenomenon of imports and the competitiveness of producing and exporting countries, both intra and extra community.

Another conclusion derived from the article is that indicated that Morocco is not the obstacle to the competitiveness of Spanish tomato, and as long as this is not recognized, the sector hardly will be profitable. Lay the blame on Morocco of the economic problems of the Spanish farmer is set to “victim” and not “protagonist”. It will be interesting to see the country progress from one type of market to another due to the current crisis of *Escherichia coli* in Europe.

[6]Source: EUROSTAT. Statistics database available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

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