



Food safety regulations, market access and international competition

- ❖ Significant agricultural trade between the Southern and Northern Mediterranean countries is a privileged field for the establishment of a bilateral food safety co-regulation, both effective in reducing the health risk and in implementing more equitable economic relationships.
- ❖ Our research investigated the economic organization of fruit and vegetables supply chains in the EU and South Mediterranean countries, and consumers' behaviours and their role in diminishing food risk. Microbiological studies dealt with risk assessment analyses and the development of good practices guidelines.
- ❖ We characterized the typologies of import chains, consumers' profiles towards food risks and South public policies to ensure safety in South domestic markets. Moreover, we provided empirical and theoretical evaluations of the role of relevant elements on which can be based food safety co-regulation policies between North and South.

Objectives

- ❑ SAFEMED aims at analysing the conditions for an international co-regulation of food safety between North Mediterranean countries (France, Italy and Spain) and South Mediterranean countries (Algeria, Morocco and Tunisia).
- ❑ We developed a multi-criteria analysis to conciliate the following objectives: 1) Ensuring food safety of imports, 2) Ensuring food safety in domestic markets, thus protecting the health of South Mediterranean consumers, 3) Maintaining a sufficient quantity of production, available in domestic markets, 4) Allowing international market access to southern countries' products.
- ❑ SAFEMED focused on the characteristics of the economies on the two Mediterranean sides and on the organisation of fruit and vegetables supply chains. An important role is given to trade and intermediate sectors. We analysed the value sharing between intermediate stakeholders located in importing countries and local stakeholders. This value sharing is taken as an indicator of the equity in North/South trade relationships.

Food safety

Regulation

**Supply chain
organisation**

Consumer health

Market access

Scientific results & innovation potential

- ✓ Empirical and theoretical evaluations of the role of relevant elements on which can be based food safety co-regulation policies between North and South: Nature of the standards in the North and South, control systems at the borders of the EU, control system in the countries of origin of European imports, cooperation for improving logistics infrastructure and the training of farmers, control delegation (private self-controls).
- ✓ Economic progress through the development of applied microeconomic models: 1) Price formation models to domestic markets in a food safety regulation context of South's domestic markets, 2) Model adapted to comparative analysis of liability rules in terms on risk efficiency (risk reducing) and economic efficiency.
- ✓ The models provide the basis for the development of decision support tools based on operational research and computer programming.
- ✓ Progress in the understanding of consumer's reaction to food risk.
- ✓ Development of risk assessment and management tools of parasites (fishery products).
- ✓ Development of guides of good practices applied to brined green olives, capers, dates, fishery products and animal products (Hazard Analysis Critical Control Point - HACCP).

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- Universidad de Almería, Departamento de Economía Aplicada, **SPAIN**
- École Nationale Supérieure d'Agronomie (ENSA), Laboratory of Food Technology, **ALGERIA**
- University of Bejaia, Operational Research Department, Laboratory LAMOS, **ALGERIA**



Quantitative and theoretical analysis

- The core of our approach lies on the crossing between the formal analysis in the framework of the microeconomic and industrial economic theory and the implementation of empirical economic and microbiologic surveys.
- Producer, exporter, importer and consumer surveys as well as experimental economics are conducted in South or North countries with both common and specific products according to the nature of the issues. Descriptive statistical analysis, data analysis, econometrics and experimental economics are used to treat the data. Empirical studies aim at building stakeholders' profiles and identifying their role in achieving efficient food safety regulations.
- Theoretical studies are built in order to 1) Characterize the rational strategies of dominant actors in North importing countries, 2) Determine the price formation process in the south domestic market, and 3) Identify the potential link between the export sector and domestic sector in South Mediterranean countries.
- In the microbiological field, audits and surveys of food establishments are conducted, professionals receive assistance, food business operators get trained, and laboratory analyses are performed.

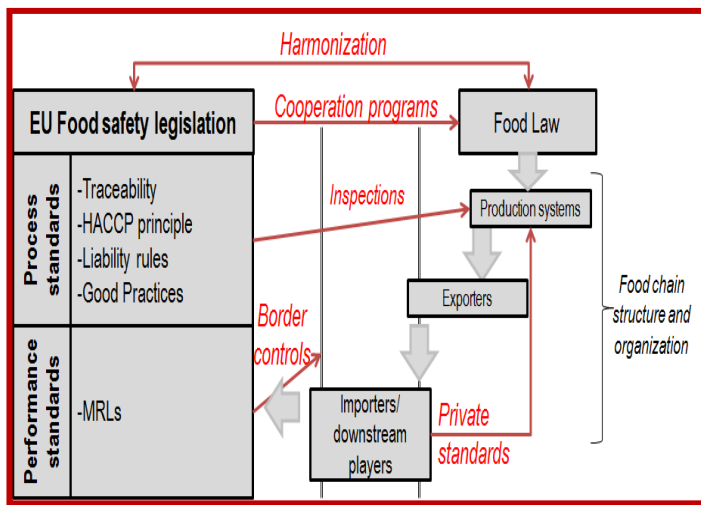


Figure 1. European Union food safety regulations and North/South supply chain interactions. Context of empirical and theoretical studies

Why collaborating?

The issues addressed are of common interest to all Mediterranean countries and call for transnational cooperation, especially because of:

- Intense trade activities between the targeted countries of the region which require more co-ordination of safety regulations.
- Trade complementarities and trade competition between the countries involved in the project.
- Existence of bilateral and multilateral cooperation institutions in the region which favour the establishment of co-regulation of food safety devices.
- Disciplinary complementarities between research centres and universities involved in the project: industrial economics (France), microbiology (Morocco, Algeria), consumer economics (France, Morocco), operations research (Algeria), microeconometrics and statistics (France, Italy, Spain, Morocco, Tunisia, Algeria).

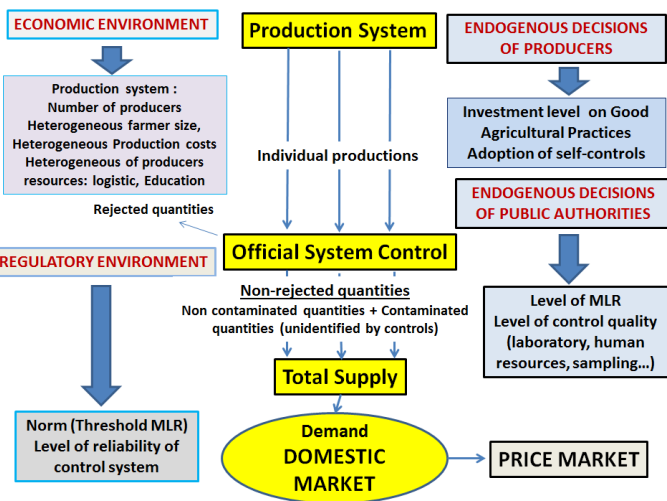


Figure 2. Representation of market interactions in the theoretical models of price formation associated with South domestic markets.

Table 1. Methodologies, products and targeted countries

METHODOLOGIES	TOOLS	PRODUCTS	TARGETED COUNTRIES
EMPIRICAL STUDIES	Producer/exporter surveys	•Dates •Tomatoes	•Algeria, Morocco, Tunisia •Morocco, Tunisia
	Importer surveys	•Fruit and vegetables (general) and some common North products •Fishery product	•Italy, France, Spain •Morocco
	Survey of institutional operators	•Fruit and Vegetables (general)	•Italy, France, Spain, Tunisia
	Experimental economics	•Tomato, salad •Fruit and vegetables	•Italian consumers, Italian products versus Morocco imported products
	Consumer survey	•Fruit and vegetables	•Morocco, local and tourist consumers
	Case studies	•Cucumber •Cucumber, Tomatoes	•Spain: Cucumber Crisis 2011 (Interview: Costa d'Almeria Enterprise), •Morocco, Spain, France, Italy, Germany (Data Analysis of RASFF & Eurostat bases), •Italy (interviews) •France (interviews)
	Audits and surveys of food establishments	•Bologna Wholesale •Perpignan Wholesale •Fishery Products	•Italy (interviews) •France (interviews) •Morocco
THEORETICAL STUDIES	Industrial economic models of price formation	•General, with reference to fruit and Vegetables sector	•Reference to South countries domestic markets. •Domestic/export sector relationships
	Model of vertical relationships	•General, with reference to Fruit and Vegetables sector	•Reference to legal rules in South countries
	International trade models	•General, with reference to Fruit and Vegetables sector	•General, with reference to North importer-South exporter relationships
OPERATIONAL ACHIEVEMENTS: MICROBIOLOGY, EPIDEMIOLOGY	Surveys, audits, data treatments, risk analysis	•Dates, brined green olives, capers, fishery products, animal products	•Morocco

ACHIEVEMENTS

Regulation in south domestic markets

- Several food safety regulation regimes exist in the South Mediterranean countries: 1) a specific regime associated to domestic markets, and 2) more diverse regimes dealing with export sectors.
- By identifying through theoretical modelling the potential links between South countries export sectors and south domestic markets, we deduce potential public strategies to create/amplify the spillover effect between the two sectors in order to reduce the risk in the domestic market.
- The difficulties in complying with norms and standards in the South are not only mechanically linked to the level of compliance costs but also to the economic, the organizational and logistic environment of operators.
- An effective import safety policy is not systematically synonymous with strengthening standards (e.g. low threshold microbiological risk assessment (MRLs)) but with an effective combination of 1) Adequate adjustment of maximum limit of residue thresholds, 2) Homogeneity and effective control at the European entry points, 3) Public-private partnership that stimulates the coordination of European importers as part of a delegation of responsibility, 4) Bilateral or multilateral agreements between Europe and North Africa to favour the emergence of an efficient control system at the country of origin.
- Food security objectives (i.e. food quantities) and qualitative objectives (i.e. health quality) are not always incompatible in South countries' domestic markets.

Microbiological risk assessments

- Risk assessment and management of parasites in fishery products (Morocco).
- Epidemiological study on parasites nationwide.
- Determination of the geographical distribution of microbiological hazards associated with imported seafood: *Vibrio* and *Norovirus* from Asia, *Listeria monocytogenes* from Europe and *Salmonella* from African countries.

Table 2. Main causes of notification for imported seafood as determined by Pareto chart

Causes of notification	Origin of import			
	Europe	Asia	Latin America	Africa
Fraude				
Histamine				
Biotoxines				
Carbone monoxide				
Additives				
Heavy metal				
Contamination microflora				
Sensory defects				
Parasites				
Pathogens				
Cold chain (poor)				
Irradiation				
Veterinary drug residues				

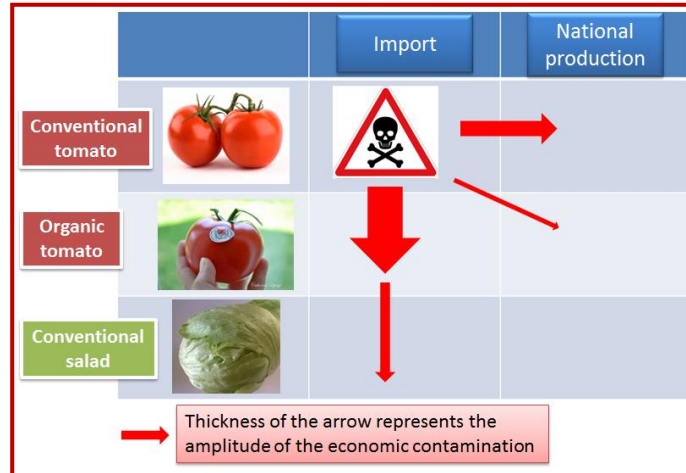


Figure 3. Consumer behaviour towards a negative information on chemical contamination of a foreign conventional product

Food risk and consumer behaviour

- Empirical evaluations of demand and experimental economics procedures are conducted to identify consumer behaviour towards sanitary risk: endogenizing of boycott phenomena, preferences between local and imported products in case of negative information on food safety (North), behaviour of tourist consumers (South).
- Conventional sectors (fruit and vegetables) can expect an undifferentiated consumer boycott (whatever the country of the crisis' origin), but the national preference dominates when it comes to reorienting consumption to a label sector: 1) In the event of a health crisis on a foreign conventional product, consumption moves more towards the national labelled sector (organic product) of the same product rather than to the national conventional substitute of the incriminated foreign product, 2) Local organic products are a safe haven in the event of negative information on chemical contamination (pesticide) concerning a foreign conventional product. However, foreign organic products are never a safe haven.

Food safety policies and North operator's reactions

- European importers increasingly demand private standards to their South suppliers who thus contribute to their rapid spread to protect themselves from the loss of market opportunities. However, different private standards' diffusion rates exist in North countries' markets.
- The heterogeneity of operators and organisational chain structures determine the food safety strategies of fruits and vegetables importers in North countries. Each operator defines its own safety strategies according to the typology of his suppliers and clients. In some North countries, product's specialization of importers seems correlated to safety requirement.
- The heterogeneity of resources allocated to the control systems of EU entry points reduces the effectiveness of normalisation policies and thus the risks associated with imports. Although it is relatively demanding, standardisation strategies based on the obligation of results in the North are weakened by the heterogeneity of official controls at EU entry points (heterogeneity of human and material resources affected to these points).



Stakeholder engagement

Useful conclusions which could help to enlighten public decisions

- Notably by identifying some potential international coordination variables, some potential intra-sectors and inter-sectors coordination, some types of effective public private partnership.

Development of guides to good hygiene

- Guides to good hygiene practices and their approval by the competent Moroccan authority: 1) For vegetable products (brined green olives, capers and dates), 2) For animal products: elaboration of HACCP manuals for egg packing centres, poultry processing (cuts, packaging) and casing units.
- Improvement of sampling plans to identify parasites.
- Proposal of guidelines and inspection procedure based on risk for imported foods of animal origin.

Academic and professional training activities

- Training of official inspectors and technicians.
- Organisation of seminars and workshops dealing with co-regulation of parasites in fish.
- Development of a platform to identify parasites by means of molecular biology.
- Promotion of North/South exchanges between PhD students through the organisation of workshops associated with research and training programs.
- Creation of a dynamic of discussions and scientific exchanges between professional and SAFEMED researchers from South countries illustrated by the organisation of a professional and academic Workshop on the development of the quality of the date sector in Algeria, Tunisia and Morocco (Biskra, Algeria, February 2015).



Figure 4. Session of practical training for fish inspection and control

Next steps

- Continuous collaborative works between partners in ongoing projects through the extension of SAFEMED research to some issues identified during the project.
- Consolidation of the research training of young researchers from South partners (notably Algeria and Tunisia) with the creation of specialisation programmes in sustainable food issues with cross approaches of industrial economics, quantitative economics and operational research. The programme implies a cooperation between INRA-France, University of Bologna (Italy), University of Bejaia (Algeria) and INAT (Tunisia).
- Development of decision support programmes by developing the existing theoretical advances on price formation modelling.
- Continuous coordination with professionals and quality control institutions for the implementation of standards and best practices.

Do you want to know more?

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Selected publications

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