



STRENGTHENING AND INTERCONNECTION OF INNOVATION SYSTEMS FOR A SUSTAINABLE AQUACULTURE IN THE MEDITERRANEAN REGION

HOW TO OPTIMIZE THE CONTRIBUTION OF THE MULTI-STAKEHOLDER PLATFORM?

The European project AQUAMED creates a multi-stakeholder platform (MSHP) which gathers producers, involved actors, researchers, NGOs, administration, and other institutions, to stimulate aquaculture innovation into the Mediterranean region. The objective of this platform is to identify:

- The axis of aquaculture sustainable development
- Resulting research needs

ORIGINALITY AND CHALLENGES RELATED TO THIS TYPE OF PLATFORM

Several countries and various aquaculture types are concerned by the creation or the strengthening of those collaborations, synergies and cooperation. In fact, it associates:

- Countries with different institutional profiles (European countries, southern and eastern Mediterranean countries)
- Aquaculture sectors more or less developed and specialized
- Diversified fish farming systems as for species and ecosystems (Fish farming in freshwater or marine water, shellfish farming, etc.)
- Research facilities and aquaculture monitoring more or less developed, interdisciplinary and interrelated.

This diversity is an asset only if it is organized. In fact, the innovative environments need specific dialogue and learning conditions that require a comprehensive analysis of the organization mode of the platform.

INVOLVED COUNTRIES

Algeria Cyprus, Croatia, Egypt, Spain, France, Greece, Israel, Italy, Lebanon, Morocco, Tunisia, Turkey.

TO LEARN MORE ABOUT IT

Mathé S. , Rey-Valette H., Blancheton J.P., 2013. Building a Mediterranean innovation system for sustainable development of aquaculture. Submit to research policy, 16 p.

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FACING HETEROGENEOUS SITUATIONS IN MEDITERRANEAN : HOW THE CONSTRUCTION OF SUBGROUPS PLAY A KEY ROLE (INTERMEDIARY ORGANIZATION MODE)

The diversity of the Mediterranean aquaculture systems and research sectors requires to identify with caution the most favorable way to collaborate and create synergies in order to promote innovations. Existing synergies show unequal relations in favor of European countries (See figure).

This figure shows that past scientific collaborations between the countries only encouraged geographical proximity. The integration of the countries to this organization mode does not promote dialogue within the MSHP. Scientific works on innovation conditions strongly promote an intermediary organization in subgroups of countries classified by their similarity of situations or challenges, in order to favor dialogue. The subgroups increase exchanges because they stimulate the organizational learning process and create new proximities. The country clusters are not settled. The groups are progressive and can be different according to the issues or topics under discussion. The intermediary groups have to gradually merge. This structure represents the organization mode of the platform. It is adaptive and progressive and guarantees the sustainability of the future Mediterranean platform.

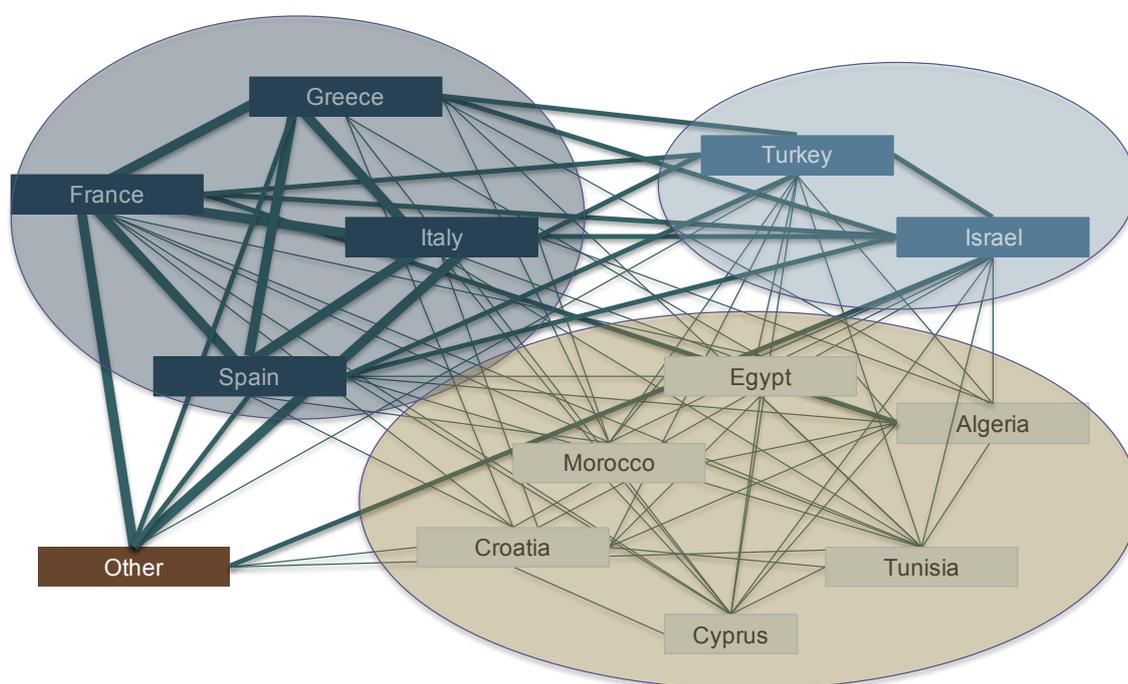


Figure : Collaboration in scientific projects of the 12 Mediterranean countries (2005-2012)

HOW TO IDENTIFY THE RELEVANT GROUPS OF COUNTRIES ?

The subgroup of countries have to optimize proximities, in other words common interests, according to, for instance, types of sectors, common constraints, institutional links between research laboratories or common practices that structure the exchange networks among researchers. Once again, those groups are temporary and can be variable depending of the nature and extent of the issues. This process consists in using typologies to identify groups of countries that have similar characteristics regarding a definite question. The main idea is that, in each group, the discussions, interactions and transfers of know-how and good practice will be more efficient and profitable due to the similar objectives and characteristics of the countries within one group.

Typologies can be made by expert assessment in simple cases, like the ones with few countries involved, or the ones with only a few variables. In more complex cases, like when groups of countries have to incorporate several variables for which they have heterogeneous profiles, we should use statistical multivariate analysis. Example given, it is the case when we wish to establish groups of countries regarding the aquaculture system types, the institutional characteristics and research capacity.

Regardless the chosen way to construct the typology, by expert assessment or by statistical analysis, the utility of clustering is related to the quality of the variables from which those typologies are created.



Those variables and indicators have to be selected regarding:

1. Their relevance regarding the problematic
2. The quality of available data for **all** countries, knowing that this quality is often heterogeneous in depending of the countries. For instance, to qualify research capacity, the ideal indicator would be the research budget related to aquaculture. However, in our case, this information was not available for the whole 13 countries. Therefore, we used a proxy indicator which is the aquaculture workforce (researchers, technicians, post-doctorates, doctorates). Ultimately, considering the differences in needs according to development levels of the sector, we have kept production (volume) related to aquaculture research workforce.

Their capacity to create balanced subgroups between countries (discriminatory character). As a matter of fact, an indicator that would lead to the creation of a first group of 10 countries and a second group of 2 countries would not be interesting since there would be a significant imbalance between the 2 groups.

TWO POSSIBLE APPROACHES OF TYPOLOGIES

Typologies allow us to propose an organization mode of the platform that is flexible and temporary because it changes according the issues under discussion. In fact, the countries will have different proximities in relation with the dimension we are looking at: production, market, governance or environmental issues. Depending on available data, we can either use statistic treatment (see following text box for further details) or expert assessment. The expert panel can be structured in the restrictive way of « National Contact Point » or, more widely, with stakeholders of the platform. This method is used when there is incomplete data or a valuable doubt on available data. The following example concerns the integration of aquaculture with environment issue. It illustrates the two approaches, their advantages and inconvenients.

STATISTICAL TREATMENT

Literature review of relevant variables and
Panel discussion on significant variables

Significant number of variables but always less than the number of countries

- National volume production by farm type (fish)
- Ecosystem type
- Exploitation type
- Research capacity

Multivariate analysis and classifications

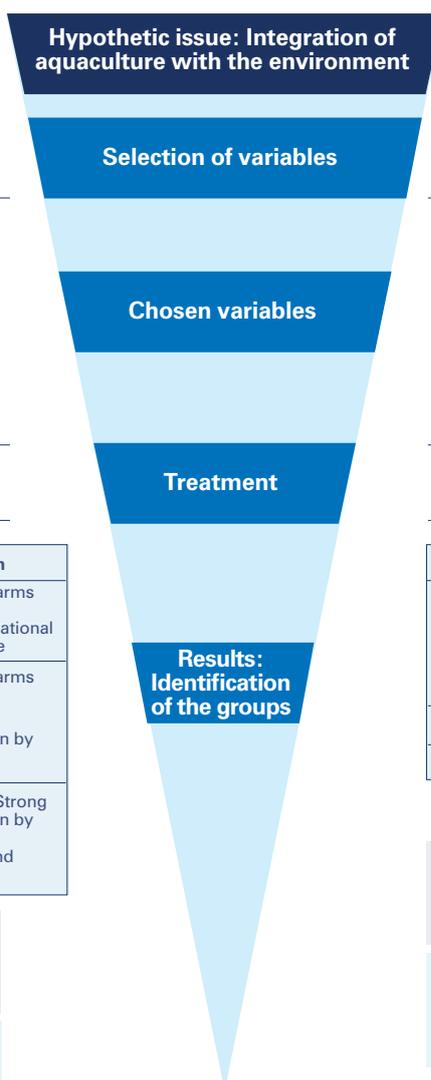
	Freshwater production	Marine production
Algeria Morocco Cyprus	Small farms (< 100T) Weak national production by type (< 1000T) National market	Medium to large farms (100-1000T) Weak to average national production by type
Tunisia Israel France Italy	Small and large farms (< 100T and 100-1000T) Strong national production by type (> 3000T) National market	Medium to large farms (100-1000T) Average to strong national production by type (> 1000T)
Croatia Egypt Greece	Small and large farms (< 100T and 100-1000T) Strong national production by type (> 3000T) National market and export	Various farm size Strong national production by type (> 3000T) National market and export

Avantages

- Precision and objectivity of the analysis
- Appreciates every dimensions and multiple proximities
- Fast results

Inconvenients

- Needs complete and reliable data
- Needs a good knowledge of statistical instruments



EXPERT ASSESSMENT

Panel discussion on significant variables

Weak number of variables (Two or three maximum)

- Total national volume production (fish)
- Ecosystem type

Discussion on classifications

Freshwater production		Marine production	
Egypt Turkey	France Israel Italy Morocco	Algeria Croatia Cyprus Tunisia	Greece Spain
Total national production volume			
> 100000T	< 100000T	< 20000T	> 20000T

Avantages

- Initiation of the discussion right away within the platform
- Little bit data required
- Good knowledge of statistical instruments is not necessary

Inconvenients

- Subjectivity regarding choices
- Restriction of variables
- Discussions require a lot of time



FEW STATISTICAL REMINDERS TO SUPPORT TYPOLOGIES

Quality constraints in statistical treatments requires:

1. The use of less variables than the number of studied countries
2. Uncorrelated variables.

The number of countries by modality has to be as balanced as possible (i.e. if we have 12 countries and 3 different modalities that we can use, we can not have two modalities of two countries and the last one with 8 countries. Most importantly, we should not choose the variables that have no discriminatory character (i.e. all the countries have the same modality) or, at the opposite, that have a strong discriminatory character (one or two countries clearly stand out from the others). Once we selected the variables, there are two recommended steps

1. A multivariate analysis (multiple correspondence analysis (MCA) for qualitative variables and a principal component analysis (PCA) for quantitative variables) leads to the identification of the most relevant combinations of variables. These combinations construct axis from which proximities between countries are evaluated (Ordinary Least Square method).
2. A hierarchic classification according to the previously constructed axis leads to the constitution of homogenous clusters (with low intra-clustering variability and a high inter-clustering variability). In other words, it is the expected typology.

Various tests have to be done so the most robust typologies can be selected.



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