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MANAGING AGRICULTURAL LANDSCAPES FOR PRODUCTION OF MULTIPLE SERVICES: THE POLICY CHALLENGE

JEL classification: Q1, Q5

Tim G. Benton*

Abstract. *There is increasing recognition that there are a range of environmental goods and services that are important to society as a whole, but may have little or no value to individual landowners whose land may contribute to the overall production of these services within the landscape. Many of these goods and services may be a minor output of any one parcel of land, but when aggregated across a landscape become important generally. Management of agricultural landscapes has typically been considered as an emergent property arising from the individual decisions of individual landowners. However, this leads to the potential for a "tyranny of small decisions" (Odum, 1982) that in aggregate can contribute to the erosion of the environmental commons. This paper outlines the evidence for landscape effects on ecological systems, and suggests that such systems should be managed at a scale greater than the farm. This in turn implies that agri-environment schemes can function with greater impact if implemented across landscapes, allowing efficiency gains required within the "sustainable intensification" agenda. The challenge then is to derive policy instruments that can drive "top down" or "bottom up" implementation of such schemes such that neighbouring landowners do the "right thing" in the "right place". The proposed mechanism for "greening" the EU's Common Agricultural Policy is currently under debate: the extent to which the proposals are consistent with the overall need to balance biodiversity and production needs is discussed.*

Keywords: *Agri-environment, Ecosystem services, landscape management, common agricultural policy, sustainable agriculture*

1. Preamble: setting the scene

The global demand for food is undoubtedly increasing given both the growth in global population and the change in demand for food as wealth increases (Godfray *et al.*, 2010; Foresight, 2011; Tilman *et al.*, 2011a), particularly evident in developing countries with the nutritional transition from predominantly vegetarian diets to one with a greater meat and dairy component.

Simultaneously with demand growth, there are two main inhibitory drivers: competition for land and climate change. There is globally limited scope for expansion of agricultural land; and the majority of recent expansion of agricultural land has come at the expense of tropical forest (Lambin and Meyfroidt, 2011; Tilman *et al.*, 2011a) – with the ensuing societal costs of loss of natural capital and emission of greenhouse gases with the resulting considerable mitigation costs

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levied (TEEB, 2010). In addition, urbanisation of the population is changing the relationship between society and the land, not least as rural populations are often decreasing, reducing access to labour capital and transport and leading to changes in agricultural practice. Land is also increasingly used for non-food crops such as oil palm and environmental degradation has also led to abandonment of former agricultural land (Jobin *et al.*, 2001; Holmgren, 2006) Climate change is also likely to have major impacts on agricultural productivity and practices (Lobell *et al.*, 2008; Battisti and Naylor, 2009); a recent study suggests that on average by 2050 yields in sub-Saharan African agriculture will decrease between 7 and 27%, with higher productivity areas being more directly affected (Schlenker and Lobell, 2010).

There are therefore strong drivers underpinning the productionist agenda: increasing demand against the constraints of no more (perhaps less) land and climate change. However, there is also increasing recognition that the environment provides an important range of services ("ecosystem services") that need protecting (MEA, 2005; NEA, 2011). These include those that may aid food production (such as soil fertility, pollination, natural pest control, water) or may have monetary or non-monetary value for society as a whole (e.g. contributing to climate control by storing carbon, flood control, cultural such as the look of the landscape and the existence of iconic biodiversity) (MEA, 2005; NEA, 2011). The history of recent decades suggests that the green revolution has often come with unsustainable environmental impacts and resource use in terms of inorganic nitrogen, phosphate fertiliser, fuel use, soil degradation and also biodiversity loss, with the resulting degradation of ecosystem services upon which both agricultural productivity (in the long term) and society relies (Chamberlain *et al.*, 2000; Benton *et al.*, 2002; Robinson and Sutherland, 2002; Foresight, 2011; NEA, 2011). Thus, there is a third constraint acting against the productionist agenda: the need to reduce the environmental impact of agricultural practices, and increase its sustainability. This "sustainability challenge" is a very real one, because in the long run, sustaining production requires it and, as with climate change (Stern, 2007), the longer that agriculture fails to embrace the agenda, and develop the business opportunities it brings, the more, in the long run it is likely to cost to get back on track (both in monetary values, ecosystem losses and human costs).

The context outlined above leads to the notion of "sustainable intensification": producing more food per unit area, with fewer inputs, whilst minimising or mitigating environmental costs (Baulcombe, 2010; Foresight, 2011; Tilman *et al.*, 2011b). The question is: how to do it? There are two broad approaches leading to sustainable intensification: (a) promoting greater resource use efficiency, and (b) management of non-production areas within the farmed landscape to support ecosystem services.

Increasing efficiency within intensive agriculture is underpinned by a range of modern approaches (Gebbers and Adamchuk, 2010). These include tillage practices (low or no-till) and ensuring that agro-chemicals are used according to the "4Rs" principal (Mikkelsen, 2011): right intervention, right amount, right time, right place. Much of the potential of precision agriculture is yet to be realised, as technology is not yet fully developed; however, one can see a future fully embracing modern sensing (in-field sensors and remote sensing), self-guided robotic machinery capable of delivering site-specific management on the scale of single plants, and where livestock husbandry (e.g. diets and medicinal interventions) are tailored to individual animal's particular phenotypic needs (Wathes *et al.*, 2008). Furthermore, the potential for wastes to be a resource is increasingly being recognised (e.g. for organic fertiliser or for anerobic digestion to provide energy for the farms' needs). Thus, in terms of within-field management, agriculture is already on a journey to increase its efficiency and grow, or maintain, yields whilst using fewer resources. Such

advances in resource use efficiency have a range of benefits (e.g. the economic benefits of farmers using less chemical and maximising its utility, and with a reduction in chemical use, a reduction in indirect environmental effects).

However, resource use efficiency is necessary, but not sufficient, to deliver the totality of the sustainable intensification agenda. In particular, a range of ecosystem services are derived from organisms living within the farmed landscape but which cannot exist (solely or in part) within a modern field. Provision of habitat is required to support beneficial animals (like bees, hoverflies and other pollinators, and small wasps and flies, which provide natural pest control) as well as animals and plants of cultural importance (e.g. butterflies, birds, mammals, meadow flowers). Furthermore, wooded non-production habitat can supplies a range of additional services including providing habitat, timber, carbon storage and influencing the water cycle by affecting rainfall, as transpiration may contribute to cloud formation in some parts of the world (Garcia-Carreras *et al.*, 2010). Non-production areas are also used as an intervention to reduce run-off improving water quality (Stutter *et al.*, 2012). They also directly impact on the "look" of the landscape, and directly contribute to its cultural value through this route (NEA, 2011). Many of the ecosystem services provided by the non-production land has none or marginal economic benefit for the local landowner, but considerable importance for society as a whole. Thus, similarly to the tragedy of the commons, if the societal benefits accruing from the non-production areas are not recognised and such areas not actively managed, then there is a risk to the service provision as a whole. Maintaining functioning ecosystem services requires concerted actions across large areas. Ignoring the needs of the birds and the bees on a single farm is unlikely to impact on their overall population sizes in a landscape because population processes occur at a scale larger than an individual farm. However, if every farmer ignores their needs, the "tyranny of small decisions" (Odum, 1982) leads to the large-scale erosion of their habitat, their populations and the services they provide.

2. The ecology of a farm depends on the surrounding landscape

Recent agroecological work emphasises that there are strong influences of the landscape[1] on the ecosystem within a farm or field (Bengtsson *et al.*, 2005; Gabriel *et al.*, 2006; Carre *et al.*, 2009; Chamberlain *et al.*, 2010; Diekotter *et al.*, 2010; Gabriel *et al.*, 2010; Batary *et al.*, 2011). This landscape effect arises because the range of available habitats coupled with the regional biota determines the local pool of species that can colonise an individual farm. Furthermore, individuals may require several habitats (e.g. overwintering, nesting and foraging habitats), and some species may move quite widely over their lifetimes: so whether individuals are observed in one place may depend on suitable habitat provision both in that place and at some greater distance. The organisms that a farmer might find on his or her land will therefore not solely depend on his management practices, but will also depend on the state of the environment in the surrounding landscape. As the surrounding landscape is a mixture of agricultural land and non-agricultural land, a farm's biodiversity also depends in part on the way neighbouring farms are managed (Gabriel *et al.*, 2010; Sutherland *et al.*, 2011).

To illustrate neighbourhood effects in more detail: organic farming causes on-farm increases in biodiversity. The extent of this increase varies with the locality but averages about 12% when

[1] where landscape is an arbitrary geographical area containing many farms

many groups are considered. If organic farms sit in neighbourhoods where organic farms are common, the average biodiversity is almost double at 20%, this increase being caused solely by neighbourhood farming practice (Gabriel *et al.*, 2010). If one considers that organic conversion is often more likely in landscapes that may be naturally higher in biodiversity because the locality may have constraints on high productivity, such as topology or climate (Gabriel *et al.*, 2009), then landscapes with many organic farms are often considerably more biodiverse than landscapes without (Bengtsson *et al.*, 2005; Hole *et al.*, 2005). However, organic farms that are very isolated in a highly productive region, perhaps where there is little natural biodiversity to colonise the farms, and where the farms alone have insufficient area to support long-term populations, may have biodiversity that is little different from a conventional farm (Brittain *et al.*, 2010; Gabriel *et al.*, 2010). Indeed, controlling for a range of landscape factors other than neighbourhood management indicates that a conventional farm in a landscape with organic farms in is typically no different from an organic farm in a conventional landscape in terms of biodiversity (Gabriel *et al.*, 2010).

Just as the benefits to wildlife of an action depend on the action, the neighbourhood management and the landscape, so do the costs (in terms of lost production arising from changing agricultural practices). If a farm is in an area where there are naturally small fields, valleys and climate that is not conducive to large-scale arable production, it may both be relatively unproductive in terms of yields and exist in wildlife-friendly surroundings (due to the many small areas of non-production land). Thus there may be relatively small differences in total yield between intensive and extensive farming (the extensive farmer may, in fact, gain in economic terms by producing a premium product), and at the same time there may be marked wildlife benefits by promoting extensive landscapes. Conversely, in a high production landscape, the total yield of extensive farms may be much less than intensive farming (which may not be compensated economically by premium production if the yield reduction is large), and at the same time, extensive farms may also not gain much in terms of biodiversity due to smaller local species pool (Hodgson *et al.*, 2010).

In addition to neighbouring farming practice interacting with the landscape to influence on-farm ecology, neighbourhoods also matter in socio-economic terms: where there are a critical mass of farmers doing the same thing in an area, a market may develop and, if farmers benefit from ecosystem services like pollination or natural pest control, they can gain from the increased ecosystem services that eventuates from landscape-level habitat availability (Sutherland *et al.*, 2011).

3. Ecosystem services should be managed at the landscape scale

Many ecosystem services (e.g. pollination, natural pest control, the maintenance of culturally important biodiversity) require non-production habitat. The smaller an individual patch of habitat, the fewer organisms can survive upon it. The more isolated a patch of habitat is, the more likely a small population will go extinct (e.g. by not finding any mates). A fundamental tenet of ecology is that for a population to persist, it needs habitat that is either a sufficiently large block, allowing a large population to exist, or if it is fragmented, that the fragments are close enough for ecological connectivity – i.e. for organisms to move from one patch to another via dispersal. Clearly, different organisms have different requirements both in terms of habitat type (such as areas of grass, hedges, woodland, water courses) and also in terms of the distance required for patches to be connected ecologically (Weibull *et al.*, 2003). An agricultural landscape with a diversity of habitat patches scattered across it, connected by a range of linear features (e.g. field

margins) therefore supports high biodiversity (Benton *et al.*, 2003). The requirement to deliver landscape-wide habitat to enhance ecosystem services in agricultural areas has been a recent focus of the literature (Benton *et al.*, 2003; Tscharntke *et al.*, 2005; Fischer *et al.*, 2006; Ricketts *et al.*, 2008; Nelson *et al.*, 2009; Gabriel *et al.*, 2010; Benton *et al.*, 2011; Boughey *et al.*, 2011).

A landscape-level network of ecological areas is not inconsistent with sustainable farm businesses for two reasons. Firstly, on most farms there are a range of landscape elements which are non-cropped areas (e.g. field margins, hedgerows, ditches). With the increasing use of precision farming techniques (such as yield monitoring) farmers also may often identify areas which are uneconomical to farm (due to local soil, drainage or access constraints). Secondly, farmers may benefit directly (in production terms) or indirectly via maintaining some non-cropped areas for wildlife. For example, the beneficial insects (such as pollinators and natural pest control agents) typically require non-cropped habitat for nesting and over-wintering. Thus, if farmers maintain grassy margins, they may reduce the incidence of aphid outbreak in the adjacent arable fields, and therefore require less plant protection products. Similarly, marginal strips may act as cover crops for shooting purposes, buffer strips for preventing soil erosion and run-off of synthetic nitrogen (and the potential regulatory costs imposed). There are also potential positive impacts from non-disturbed ground into fields that may influence soil communities and soil fertility (Manning *et al.*, 2006; Ramette and Tiedje, 2007). Non cropped areas can potential provide other services, such as production of domestic fuel in terms of timber, and for many farmers, there are non-economic gains that can arise from public perception of the positive impacts of stewardship on the countryside (NEA, 2011).

Thus, an agricultural landscape that is a mixture of farmed land and a network of non-cropped areas of various types can potentially provide both the agricultural business that farmers rely on as well as contribute to the common societal goods of protecting and enhancing biodiversity and the services it provides. A landscape that is farmed extensively (say organically) does not necessarily have greater potential for biodiversity and ecosystem service provision than a landscape that is farmed intensively, as long as the land not managed for agricultural production is actively and appropriately managed to provide a diverse network of non-cropped areas.

4. Policy challenges

The discussion above lays the case for recognising that sustainable agricultural landscapes require both within-field resource use efficiency and also a network of non-production habitat, suitable to the overall location. This creates a series of challenges to implement agri-enviornmental schemes as it implies that (a) what is "best" to do to optimise ecosystem services in production landscapes will vary by location, (b) that the same actions by landowners in different locations can have different impacts suggesting site-specific incentives, and (c) there are benefits to coordinating actions across landholdings, scaling up from single farms to landscapes.

a) The challenges of location-specific actions

Landscape factors ensure contrasting benefits of the same intervention in different locations, suggesting that tailoring actions to locations would be beneficial. This location-specific requirement will provide a challenge for policy formulation and implementation at a very large scale. One can imagine a common policy framework, setting the overall aims and process for making decisions, and the evidence base required to inform the decisions, with implementation devolved

down to an administrative level at a granularity appropriate to the granularity of the landscape (e.g. a county level, or a regional level). Such a process would be considerably more expensive to implement than a more uniform policy process, but the gains in the resulting ecosystem services (if assigned any reasonable monetary value (NEA, 2011)) would make this investment worthwhile.

It is currently possible, within a research framework, to develop models that can predict how ecosystem service provision can vary with the landscape configuration (i.e. the network of patch sizes, types and distances between, and the matrix of production land). These models can also predict farm yields. They therefore allow the exploration of the joint relationship between farm outputs and ecosystem service provision, and how this relates to the configuration of patches of non-cropped land. Using such models one can specify the configuration that best optimises farm yields and landscape level services (Nelson *et al.*, 2009). Thus, at least in principle, each individual landscape can be optimised to maximise delivery of ecosystem services given the need to ensure farmers' economic returns.

b) The same action gets place-specific rewards

An often expressed principle of equity is that someone doing the same job should gain the same rewards as another(Fawcett, 1918), so there is a natural reluctance to reward the same action differentially simply depending on location. However, if we consider changing the conceptual framework from supporting the action to supporting the outcomes – "payment for ecosystem services" (Jack *et al.*, 2008) - then it becomes less contentious. Farm managers, undertaking identical management in different locations, naturally understand that yields will vary according to local factors; so if standard farm-management gains place-specific rewards, it is not entirely evident that agri-environment management should not do so too.

c) Coordination between farmers

The benefits of scaling up from the farm to landscape scale in agri-environment management have been highlighted before (Gabriel *et al.*, 2010). The challenge of agri-environment implementation is to find ways to encourage neighbouring farmers to do similar things, such that benefits arise at the landscape scale. One can imagine both top down and bottom up approaches. The top down approach would be to set an incentive scheme that preferentially rewards the options most beneficial to the locality, in the expectation that neighbours will make similar choices. The bottom up approach would be preferentially to reward neighbourhood cooperation, such that farms can develop cooperative ideas and receive preferential rewards for the more beneficial approach. To illustrate this, imagine if, in a specific location, it is appropriate to maximise the area of a block under nature management (say as nesting habitat for an iconic bird). Three neighbouring farmers could add considerable value to any land they set aside for nature if they set land aside at the intersection of their boundaries thereby creating a single large block (Hodgson *et al.*, 2010). This should be preferentially rewarded relative to them creating three separated blocks.

5. The CAP proposals as a case study of modern agri-environment management

In October 2011 the European Commission forwarded proposals for reform of the Common Agricultural Policy (hereafter CAP) to the European Council and Parliament, initiating discussions that will last up to mid-2013. The proposals aim to generate a compulsory amount of non-cropped "ecological focus areas" (EFAs) comprising 7% of the total farmed area across

the landscape. This has potential benefit in terms of being a mechanism to provide a landscape scale network. The UK Curry report first called for "broad and shallow" interventions to produce more sustainable landscapes in 2002 (Curry, 2002), and ensuring that all farms manage EFAs is consistent with this approach. The proposals also aim to encourage landscape heterogeneity by stimulating production of multiple crops (including permanent pasture). Encouraging greater heterogeneity has also been widely discussed for a decade (Benton *et al.*, 2003). Thus, at first sight, the CAP proposals, in principle, could be beneficial.

The "ideal" CAP reforms would be to encourage landscape measures that used the EFAs to create a "well connected" ecological landscape (with patches of suitable habitat sufficiently close for dispersal/movement from patch to patch), with a range of linear habitat types (e.g. flower rich margins, grassy margins, hedgerows) creating the connectivity and with patches of land for non-agricultural specialists (e.g. woods, grasslands, wetlands). Furthermore, as outlined above, the specificities of the "ideal landscape configuration" will vary from location to location, depending on the local habitat, geography and biota. Thus, the considerations for landscape-scale management of habitat: (1) the amount and type of habitat, (2) its spatial extent, (3) its spatial distribution and the connectivity it brings to a landscape, (4) the quality of the habitat created and, (5) its location-specificity. The current proposals address (1) (by specifying a percentage of EFAs) and (2) by making receipt of the Pillar 1 payment contingent on this, ensuring broad take-up of the prescription across very large areas.

The degree to which the proposals really contribute positively to environmental outcomes will depend on the final details. If the EFAs are left as unmanaged set aside, the areas will have rather less ecological value than if they were actively managed to provide good habitat (Sotherton, 1998) and therefore, overall, the greening proposals would have little benefit (relative to the potential cost of removing productive land from production). Conversely, if the land is actively managed to ensure delivery of ecosystem services a landscape with a 7% network of "green veins" could be highly beneficial. Thus, the requirement for active management is key to whether the greening proposals will create a net benefit. Payment for service delivery would allow land managers to undertake what they are interested in doing, with perhaps farmers having the greatest interest in delivering the maximum gains, leading to landscape appropriate actions. Discussion of how to get the greatest gains would lead to productive partnerships between farmers and agri-environment advisors in agencies or NGOs.

After management, the second most important issue is the spatial layout of the EFAs. A connected landscape requires that there is sufficient connection between habitats for a range of organisms to live, and disperse along/between linear features or patches. Thus, ensuring there is a mix of features, patch sizes and habitats is crucial to developing a connected landscape (7% as a single block will not be as good as 7% as a network for the majority of species). This implies that for significant gains to be made in delivery of ecosystem services, connected landscapes should be planned and advisors work with farmers to guide their actions towards those that will be most beneficial. To a certain extent, at the farm level, this already occurs within some schemes (e.g. The UK's Higher Level Schemes, Australia's Box Gum Grassy Woodland Environmental Stewardship Scheme). Furthermore, owing to the location-specific costs and benefits of interventions, the impact of 7% of land set aside into EFAs will vary: in some places the optimised landscape to deliver production and ecosystem services will require more or less than this figure. This implies that allowing member states the potential to vary this figure locally (e.g. by balancing Pillar 1 payments with Pillar 2 agri-environment payments), whilst maintaining an average 7%, would be beneficial.

Encouraging spatial heterogeneity to promote biodiversity gains is a sensible option as identified frequently in the ecology literature. The proposals aim to promote this by encouraging "arable land to consist of 3 different crops simultaneously". However, to make this meaningful ecologically, the heterogeneity needs to be promoted on an absolute spatial scale (e.g. a 2 x 2 km landscape) not a relative scale (the farm). To illustrate this, a very large farm could comply but still maintain areas of homogeneity greater than the total area of a small farm.

6. Conclusions

Sustainable intensification is necessary if the issue of looming global food insecurity is to be avoided (Foresight, 2011). Environmental sustainability is necessary, by definition, to sustain agricultural production into the long term. Sustainability has many elements that contribute at different spatial scales, from very local actions on soil to improve conditions in a particular small patch, to the farm contributing to a landscape of habitat providing a range of ecosystem services that the land manager may not get value from, but is valuable for society (e.g. biodiversity conservation, carbon storage, water quality). As has long been recognised in the literature on water resource management, the appropriate scale to consider ecosystem service provision is a larger scale than the scale of agricultural management (Van Zyl, 1995; Pollard and Huxham, 1998; Fenemor *et al.*, 2011). For water, there is a natural scale, that of the "catchment"; for other ecosystem services, there is no natural scale that applies across all services, but the appropriate scale is greater than the farm and is one that can reflect natural variation in underlying climate, topography etc. This landscape scale would be at a scale of 10s to 100s of square kilometres.

Large scale, integrated management, is possible: the EU's Water Framework Directive is large scale management, judged by compliance with quality standards, and requires site-specific assessment and actions to produce set outcomes. Agricultural landscapes need to be approached in a way similar to that in which catchments are managed for water quality. If this happens, sustainable intensification of agricultural landscapes will be possible, without further eroding the ecosystem services that require non-production land.

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ENVIRONMENTAL APPROACH OF THE CAP LEGISLATIVE PROPOSAL

JEL classification: Q18

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Abstract. *The proposals for the CAP for the 2014–2020 period were heralded by the Agriculture Commissioner as providing 'a new partnership between Europe and its farmers' that will 'enhance both the economic and ecological competitiveness of agriculture', to meet the 'challenges of food security, sustainable use of natural resources and growth'. For the past two decades, the integration of environmental concerns within the CAP has been characterised by a gradual shift in emphasis towards more targeted, regionally defined and programmed approaches, embodied in the agri-environment measures and Pillar 2 more generally, underpinned by cross compliance. These elements all remain within the current proposals, however, a major new element has come into play – the introduction of green direct payments in Pillar 1. The proposals aim to extend a basic level of environmental management to the majority of farmland in Europe, recognising the scale of the environmental challenges to be met. However, these are contentious proposals, faced with criticisms that they are both too demanding and too weak. At the same time, their introduction is coupled with a net reduction in the Pillar 2 budget over the next programming period. Within the context of the broader CAP proposals, this paper considers the opportunities and risks embodied in the proposals for green direct payments as well as possible alternative options. It considers the implications of the proposals for the environment and whether they genuinely will lead to the much needed improvements in environmental outcomes required to meet the significant environmental and climate challenges facing the EU.*

Keywords: *CAP reform, greening, environment*

1. Greening the CAP – the context

The integration of environmental concerns into the CAP, or 'greening' as it is often referred to, features as a core element of the objectives and rhetoric surrounding the legislative proposals for the future CAP. The 'sustainable management of natural resources and climate action' is one of three core objectives proposed for the CAP for the period 2014–2020, alongside viable food production and balanced territorial development in line with the objectives of the EU2020 Strategy (European Commission, 2010a) and is justified due to the fact that environmental public goods are not adequately provided by the market[1].

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Note: The opinions expressed in this article are the sole responsibility of the authors and do not necessarily represent those of IEEP or the European Parliament)

[1] Explanatory memorandum of COM(2011) 625/3

The environmental challenges facing the EU continue to be significant (see for example EEA, 2010). A step change is needed to increase the provision of environmental public goods over a far greater area of farmland. This requires a combination of simple, broad brush management and more tailored and targeted approaches (Hart *et al*, 2011). There is a variety of reasons why this is not happening currently, which involve the policy architecture at the EU level as well as other political, financial and institutional factors which affect implementation on the ground (Poláková *et al*, 2011).

Addressing the EU's environmental challenges, not least meeting ambitious targets for biodiversity and climate, is only one of a range of factors driving the CAP reform proposals. Other strong drivers include a need to respond to questions about the purpose and legitimacy of direct payments, still representing the lion's share of CAP expenditure, and to change the basis of these payments away from historic production. At the same time the proposals have had to take into account the current economic crisis which is placing significant pressures on the budget in many Member States, reflected in the Commission's proposal to keep the overall CAP budget at 2013 levels (without account being taken of inflation) and not to increase the proportion of the CAP available for Pillar 2, to avoid Member States needing to increase their co-financing rates.

2. Key environmental components of the CAP legislative proposals

The Commission's proposals for 'greening' the CAP comprise a number of different elements, including cross compliance, the new green element of direct payments, a re-designed and restructured rural development policy and an increase in the scope of the Farm Advisory System (Bascou, 2012).

To date, two policy instruments have been used predominantly to deliver environmental public goods through the CAP – rural development policy, particularly through the agri-environment measure, and cross compliance. Rural development policy has become the core element of the CAP to deliver targeted actions for achieving environmental benefits from Europe's rural areas. A particularly important characteristic of rural development policy is the flexibility given to Member States and regions to design multi-annual programmes of measures that respond to the needs and priorities identified nationally, regionally or locally, within an overarching EU framework. However, to be effective, rural development policy needs to work alongside regulation that is implemented fully and adequately enforced. Within the context of the CAP, cross compliance (both the Statutory Management Requirements (SMRs) and standards of Good Agricultural and Environmental Condition (GAEC)) provide an important baseline for environmental management, particularly in relation to soils, water and biodiversity (Cooper *et al*, 2009; Poláková *et al*, 2011).

Both these elements remain in the new proposals, albeit with some changes. Indeed, future rural development policy will continue to play a critical role in supporting the provision of environmental public goods in rural areas. Two of the six priorities for action proposed relate specifically to the environment[2]. 'Caring for the environment' and 'contributing to climate change

[2] Objective 4: Restoring, preserving and enhancing ecosystems dependent of agriculture and forestry; and Objective 5: Promoting resource efficiency and supporting the shift towards a low-carbon and climate resilient economy in the agriculture, food and forestry sector

mitigation and adaptation' also feature as common goals and cross-cutting themes, which will have to be reflected adequately in the activities Member States choose to fund under all priorities within future rural development programmes.

The range of measures relevant for the environment within the legislative texts has not changed significantly, but includes a welcome new focus on innovation and collaborative action. However, the replacement of the current axis structure with six priorities, without any constraints on which measures can be used to deliver each priority, should help to increase the scope, flexibility and incentive for Member States to address environmental priorities as creatively as possible and to use packages of measures and promote action to deliver the needs identified within their programmes (ENRD, 2011; European Commission, 2011). The proposal to earmark 25% of funds for land management and climate actions, although not legally binding in its current form, is also positive to ensure that limited funds are not diverted wholly into measures for competitiveness and risk management without taking account of environmental priorities.

In addition the introduction of a new initiative, the European Innovation Partnership (EIP) for agricultural productivity and sustainability, offers new opportunities for delivering environmental benefits. In light of future pressures on rural land in the EU and the slow-down of growth in Europe's technological development, this aims to integrate sustainability into all components of agricultural production and 'promote a resource efficient, productive and low emission agricultural sector, working in harmony with the essential natural resources on which farming depends' (European Commission, 2012).

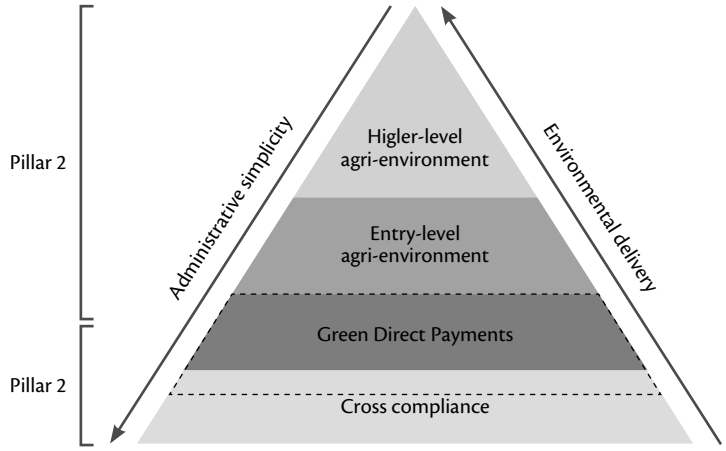
Less positive for the environment is the lack of commitment to increase the proportion of the CAP allocated to rural development policy, with the result that its budget continues to be dwarfed by that of Pillar 1 and will decline in real terms from 2014–2020. Indeed, alarmingly, it is proposed that 12 Member States should be permitted to transfer a proportion of their rural development budget to Pillar 1 to help bring their income support payments nearer to the EU average, thereby reducing an already stretched budget yet further.

In relation to cross compliance, positive developments involve the inclusion of new requirements for Member States to develop GAEC standards for maintaining soil organic matter and protecting wetland and carbon rich soils. The CAP proposals also place a reinforced emphasis on advice, with the focus of the Farm Advisory System now expected to go beyond cross compliance and include environmental issues under rural development policy as part of its minimum scope.

The most radical new environmental element of the current CAP proposals, however, is the introduction of environmental measures as part of Pillar 1 direct payments. The proposals consist of three distinct measures, designed to be universally applied, annual and non-contractual 'ensuring that all EU farmers in receipt of support go beyond the requirements of cross compliance and deliver environmental and climate benefits as part of their everyday activities.'[3]. Thirty per cent of direct payments are to be allocated to these measures and they are to be mandatory for all recipients of direct payments except registered organic farmers and those entering the new small farmers scheme. If any of the requirements are incompatible with management plans in Natura 2000 areas, then they will also not apply. They will therefore form a new reference level for activities funded through relevant rural development measures (see *Figure 1*).

[3] Explanatory memorandum of COM(2011) 625/3

Fig. 1 - Simplified diagram of how green direct payments fit within the CAP structure



Source: Higler-lee

These 'green direct payments' have proved the most contentious element of the proposals from an environmental perspective. The debates focus on ways of amending their design and implementation, on the one hand to improve the environmental benefits that can be achieved through the measures, and on the other, to minimise the degree to which the measures impinge on productive farm activities. It is these proposals for greening direct payments that form the focus of the remainder of this article.

3. Greening Direct Payments

Three measures have been proposed within the Pillar 1 Direct Payments system as 'payments for agricultural practises [sic] beneficial for the climate and the environment'[4]. These are:

- Crop diversification - requiring 3 different crops on arable land of more than 3 hectares;
- Permanent grassland - requiring the maintenance of 95% of the area of permanent grassland on the farm in 2014; and
- Ecological Focus Areas - requiring a proportion (currently seven per cent is proposed) of a farm's eligible hectares under arable or permanent crops to be allocated for ecological purposes, for example as landscape features, buffer strips or fallow land.

Land registered as organic is exempt from these requirements. The Commission has made it clear that the intention is to increase the geographic area of agricultural land over which environmental management takes place. The proposals leave a great deal still to be interpreted and defined. There is very little further detail within the legislative proposals or the Impact Assess-

[4] Chapter 2, Articles 29–41 of COM(2011)625/3, Proposal for a Regulation of the European Parliament and of the Council establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy (2011/0280 COD)

ment on how these measures might work in practice, with the Commission having the power to develop the detail through delegated acts.

The list of measures ultimately proposed differs somewhat from the ideas put forward in the initial Communication on the CAP towards 2020 (European Commission, 2010b). This suggested a crop rotation measure instead of the more limited crop diversification measure as well as a green cover measure on soils to avoid bare soil, particularly over the winter months.

In putting forward these proposals, the Commission has recognised the scale of ambition needed to make a step change in environmental delivery required. In principle, the greening of direct payments could:

- provide a strong environmental baseline for all CAP support provided to land managers;
- increase uptake of basic environmental management across the majority of the farmed landscape;
- provide a foundation on which more demanding agri-environment schemes under Pillar 2 can build; and
- release more funding for targeted Pillar 2 measures (Hart and Baldock, 2011).

However, the question remains whether the proposals in their current form are capable of delivering this ambition. The magnitude of the benefits will depend on the detailed requirements, which have not yet been determined. Any assessment of potential impacts, therefore, is highly speculative. Nonetheless, green direct payments should increase the level of environmental management delivered in the EU simply by providing a stronger means of ensuring a basic level of management across the farmed area than the GAEC standards, whose delivery is variable (Alliance Environnement, 2007). The extent of this added benefit is difficult to measure, and inevitably will be greater in countries which have been less ambitious in implementing and enforcing cross compliance (IEEP, 2011).

In relation to the individual greening measures, each has a range of potential benefits and issues which may serve to constrain this potential. For example, in relation to the crop diversification measure, introducing a minimum level of diversity into cropping patterns has the potential to bring some benefits for the environment, e.g. for soil biodiversity, particularly if it encourages greater rotation of crops, including the introduction of fallow or legumes into the rotation.

Requiring permanent pasture to be maintained at the farm level should be beneficial for biodiversity as well as water quality, soil quality and carbon storage. However, the measure focusses only on maintaining grassland area rather than protecting or enhancing its ecological quality. The most widespread impacts would be to constrain the conversion of improved grasslands or semi-natural grasslands of high biodiversity value to temporary grasslands and arable crops (e.g. maize) (Poláková *et al*, 2011). The setting of 2014 as the baseline for the measure is a concern, however, as it provides a powerful incentive for the ploughing up of permanent grassland in the interim, which would lead to significant ecological damage as well as soil carbon losses (Jowit, 2012).

The measure with the greatest potential to deliver additional environmental benefit is the Ecological Focus Area (EFA) measure. Managing a proportion of the cropped area for ecological purposes has the potential to provide benefits for biodiversity (birds, mammals and invertebrates), water quality, soil quality and carbon storage if managed appropriately. This is evidenced from monitoring results of similar management undertaken under agri-environment schemes and set-aside in the past. However, the evidence also demonstrates that the range and level of environmental benefits provided by an EFA depends on a number of factors, including the

location of the option; its permanency; the management and agricultural practices pursued; the proportion of the holding managed as EFA; and the environmental management required (Allen *et al*, forthcoming). There is also a risk that the potential benefits of EFAs, particularly for biodiversity, may not be maximised due to farmer preferences for field boundary and margin management rather than creating environmental areas in-field, such as areas of fallow (Poláková *et al*, 2011). It is argued, therefore, that targeting and appropriate tailoring of management practices within EFAs could improve the outcomes for biodiversity as well as water quality, soils, carbon storage and climate adaptation (Allen *et al*, forthcoming; Poláková *et al*, 2011).

It is important not to assess the potential impact of the green direct payments in isolation, however. Indeed, perhaps the greatest potential environmental benefit from these measures is the foundation that they provide on which more focussed agri-environment schemes can build within rural development policy.

Despite the body of evidence demonstrating that greening would have potential to deliver a positive environmental impact, it is this part of the Commission's reform package that has been the most contentious. COPA-COGECA (2012), the European umbrella farming lobby organisation, has cited inefficiencies in the Commission's preferred way of achieving environmental benefits, along with the possibility of perverse outcomes, including short-term impacts on food productivity. In the opinion of some environmental NGOs (Birdlife, 2012; EEB, 2012), however, some of the greening measures do not go far enough and may risk watering down previous requirements established under cross compliance.

The reaction of the early institutional debate is harder to characterise, beyond observing the general negativity surrounding the greening plans. The perceived added cost and bureaucracy involved with green direct payments has been a common theme of the public debates within Agriculture Council. This is mirrored in the European Parliament, with the Agriculture Committee even adopting into its opinion on the Commission's Biodiversity Strategy to 2020 the fact that it "does not support the Commission proposal to create an additional, 'greening' payments component, as proposed in the draft reform of the CAP towards 2020" (European Parliament, 2012).

4. Potential weakening of the proposals

Given such opposition to the proposals currently on the table, there is a considerable risk that the environmental potential of the existing legislative provisions could be weakened through the negotiation process or, less likely, removed altogether (Matthews, 2012).

Options raised so far include the possibility of making the greening payment voluntary at farm level, so that the sanctions for non-participation would not extend beyond the loss of the green payment itself. A voluntary approach would inevitably increase the policy 'deadweight', as economic theory suggests such an approach would lead farmers to opt out where they face greening costs at or above the level of green direct payments. If these farmers were taken out of the equation, this is likely to leave only those farmers taking up the green measures for whom little change would be required to their current management. Moreover, it would undermine the intended establishment of a higher universal baseline of environmental delivery across the whole EU, one of the main justifications for a Pillar 1 approach to greening. It could also bring into question the rationale for the whole policy change, since it would reduce the added environmental benefit delivered to address the environmental challenges. Merely maintaining the status quo

could, at best, be seen as helping to constrain the continuation of certain negative trends that might otherwise be observed in some regions, for example the conversion of permanent grassland to arable cultivation or temporary leys.

Among the possible counter arguments is the view that rewarding voluntary participation could promote a more committed attitude towards delivery compared to penalising non compliance (Hart *et al*, 2011). For some more economically liberal Member States it might also be appealing that the shield of environmental legitimacy would be narrowed to cover only the greening payment, exposing the Basic Payment Scheme to pressure in relation to its ongoing legitimacy, either now or in future. Voluntary greening might seem more attractive if the unspent money from farmers opting out was transferred to Pillar 2 and ring fenced for agri-environment measures, thereby at least maintaining the original purpose of the allotted funds. The attraction of this proposition would be increased should there be no co-financing requirement attached to the funds transferred, thereby extending the precedent set by the arrangements for the proceeds of the plans for capping.

Concerns have also been raised that the commitment to agri-environment measures cultivated over many years could be undermined by the introduction of greening in Pillar 1. The lack of detail on how the interface between green direct payments and agri-environment schemes in Pillar 2 is intended to work does not help allay these fears. The raised baseline for Pillar 2 schemes could also make them less attractive to farmers, with agreement holders left questioning whether the extra imposition of particularly the EFA requirements within greening would take too much of their land out of production. As Matthews (2012) points out, reduced engagement in Pillar 2 schemes, which usually cover a more comprehensive set of environmental measures than those proposed for Pillar 1, could risk a net decline in the supply of environmental public goods, contrary to the intention of the greening proposal.

These concerns have led a number of stakeholders[5] and some Member States to argue that the derogation afforded to organic producers should be extended to those complying with the requirements of other quality assurance labels relating to sustainable production or those enrolled in agri-environment schemes. The administrative advantages of this are, however, countered by a number of other issues, particularly questions of value-for-money and additionality. In the case of private quality assurance schemes, the green direct payment would effectively double fund the public goods which have already been supported privately through conferring a marketing advantage. In the case of agri-environment schemes there is the risk that public money is used to pay for the same management twice. Additional clarity is needed on how these elements are going to interact and Matthews (2012) suggests that "the proposed exemption for organic farmers should be amended to keep a clear distinction between what is paid for in Pillar 1 and what is supported in Pillar 2". Other solutions could either temporally or spatially restrict the double-funding overlap, perhaps by extending a derogation for those in agri-environment schemes only to existing agreement holders, as a transitional measure, or by lowering the EFA requirement for those entered into schemes. Whatever way such a derogation might be contemplated, Commission oversight would be needed to ensure environmental equivalence with the Pillar 1 green-

[5] See, for example, European Landowners' Organization (2012) and National Farmers' Union of England and Wales (2012), both of which suggest consideration should be given to granting green direct payments *ipso facto* to further categories of farmers beyond the current derogations, including those who are undertaking agri-environment commitments.

ing requirements, due to the high variability of existing entry level agri-environment schemes (Keenleyside *et al*, 2011).

5. Alternative options – the opportunities and the risks

The dissenting reaction to the Commission's preferred approach to greening and calls for it to be watered down has stimulated interest in finding an alternative that guarantees additional environmental benefit. Two recent papers (Matthews, 2012 and Allen *et al*, forthcoming) have sought to categorise potential responses to the Commission's plans. Several common themes have emerged:

- Increasing the flexibility for Member States;
- The development of a 'conditional greening' approach; and
- Delivering more ambitious outcomes through more targeted agri-environment measures in Pillar 2.

The relative merits of these options are evaluated briefly in *Table 1* below. This provides a short description of the option and assesses the pros and cons of each. Two variants are explored in relation to increasing flexibility. The first would add additional measures to the three currently identified by the Commission in the form of a menu. The second would rationalise the greening approach to focus only on the EFA measure, broadening its scope in relation to the type of land covered and options available. The 'conditional greening' approach considers a variant on the proposal put forward by the European Parliament in response to the Commission's Communication on the CAP towards 2020 (European Parliament, 2011). In addition to the potential for delivering the greening proposals through a Pillar 2 approach, an additional alterative is considered, namely the expansion of cross compliance.

Tab. 1 - Comparison of alternative greening options

Possible alternative approach	Pros	Cons
Increased flexibility / targeting		
Menu of greening options: *additional measures added to the current list of three* to provide more flexibility to Member States to choose a minimum number of measures from a common but longer list. Some measures could remain compulsory. Measures could include: soil cover, nutrient, soil and carbon management plans or a strengthened focus on High Nature Value farmland.	• Allows measures to be chosen that fit specific circumstances • Broader choice could potentially address wider range of environmental and climate change objectives • Control is prior to receipt of payment	• List remains general in nature • Relative weightings between options may be required to avoid Member States choosing least-cost options • Lack of uniformity could blur dividing line with Pillar 2 schemes and result in farmers in different countries being treated differently

Possible alternative approach	Pros	Cons
Extended EFA option: whereby green direct payments would consist exclusively of a whole-farm EFA measure, covering all eligible land. Other currently proposed measures would become GAEC standards. Categories of EFA could be distinguished as follows: a) landscape features (e.g. afforested land, hedges, terraces) b) uncropped land (e.g. land left fallow) c) certain management within productive areas (e.g. soil cover; reduced inputs; improved soil organic matter; use of clover in intensive grassland; maintenance of HNV grassland). Since each category would result in differing levels of environmental benefit, the total area of EFA required at farm level would depend on the mix chosen by the farmer, with each category given a weighting.	• Streamlined approach with only 1 greening measure • Flexibility for Member States to choose eligible features or actions relevant to their specific priorities could lead to greater environmental outcomes • Rewarding positive environmental management within EFA allows farmers to maximise the environmental benefits while minimising the impact on production • Control is prior to receipt of payment	• Increased administrative complexity • Need for Commission to approve plans to ensure equal environmental commitments between Member States and compatibility with Pillar 2 schemes • Danger of increasing deadweight effect if allows easiest options to be chosen, and risk increased by extending EFA to cover semi-natural grassland
Conditional Greening		
Conditional greening approach: farmers would be required to enter into an appropriate base level agri-environment scheme in Pillar 2 in order to be eligible for receipt of their (full) Pillar 1 direct payments. As distinct to the above discussion on potentially extending the organic derogation, this would make entry into an agri-environment scheme a necessary rather than sufficient condition for greening. This may require additional funds to be available within Pillar 2 to fund the expanded coverage of AE schemes that this would entail, transferred from Pillar 1.	• Retains advantage of universal reach of greening and extends the reach of basic agri-environmental management • Minimises disruption to existing agri-environment scheme members • Uses existing control systems, so no need to develop additional Pillar 1 controls • Equivalence between Member States can be checked during existing Commission approval process	• One off increase in resources needed to amend agri-environment schemes where these are not sufficiently well developed • Could compromise purity of income forgone/additional costs calculation for agri-environment through link with Pillar 1 income support payments • Political resistance to increasing the transfer of funds to Pillar 2
Pillar 2 approach		
Funding greening purely through Pillar 2 voluntary approach by agreeing a higher proportion of the CAP budget for rural development (as part of the Multiannual Financial Framework or through continued compulsory modulation) or *increasing the flexibility* provision to make transfers from Pillar 1 to 2.	• Schemes retain multi-annual, regionally defined, menu driven, targeted and contractual nature, important for optimising environmental delivery • Facilitates cost-effective expenditure on effectively targeted and tailored schemes • Maintains clear distinction between cross compliance and Pillar 2 schemes	• Voluntary nature loses universal reach of CAP greening • Undermines Commission's objective of increasing legitimacy of Pillar 1 direct payments • Increased national co-financing requirement (unless percentage obligation reduced or exemption applied to funds transferred from Pillar 1)

Possible alternative approach	Pros	Cons
Enhanced cross compliance		
Greening merged with GAEC, with additional green elements introduced to Pillar 1 by expanding the existing list of cross-compliance conditions	• Potential for administrative simplification, obviating the need to split direct payments into separate envelopes and for there to be separate payment and control systems	• Loss of presentational advantage that greening is 'reward' rather than a 'sanction' • Increased legitimacy in eyes of public possibly also muted • Continuation of existing issues with adequate checking and enforcement • GAEC checking is ex post to receipt of payments so less of an incentive to comply
Source: Own elaboration drawing on options and analysis from Matthews (2012) and Allen et al (forthcoming)		

What is clear from this analysis is that there is no perfect alternative approach to greening the CAP, with any choice inevitably involving compromises. The amount of additional benefits delivered from the scale of investment in greening is clearly of paramount importance from an environmental perspective, however, a trade-off has to be made between environmental additionality and administrative simplicity. While it must be accepted that some increased complexity will result from a process of better targeting payments at policy objectives, such as delivering environmental public goods, a useful guiding principle should be to ensure that the level of administrative and control requirements is pitched such that it is proportionate to the amount of benefits derived.[6]

6. Conclusions

With the nature of the CAP greening that will be finally adopted still undefined, it is too early to say whether this round of reform will represent a significant shift towards a refocusing of the policy on the provision of public goods.

The recent history of the CAP has been characterised by a gradual shift in emphasis towards the more targeted, regionally defined and programmed approach of Pillar 2. However, the current proposals represent a halt to the steady growth in the importance of the rural development pillar that has been witnessed since it was created in the Agenda 2000 reform (Matthews, 2012). Whether the previous trajectory will be re-established in the future remains to be seen, but what is apparent is that the political and economic context of the post-2013 CAP debate has not been compatible with increased Member State co-financing of an expanded Pillar 2.

Given this economic reality, Commissioner Cioloș has sought an alternative means of improving EU agriculture's provision of environmental public goods. Other ways of transitioning towards a more integrated land management policy could also be possible (Hart *et al*, 2010), including conferring Pillar 1 direct payments with more of the characteristics of Pillar 2 (Buck-

[6] Such a principle was captured in a Memorandum tabled at the March 2011 Agriculture Council, supported by the majority of Member States, which noted that "An acceptable justification for increased [administrative] cost might include better targeting of funding towards the provision of public goods, or a reduction in risk to EU funds – providing these benefits exceed the costs of achieving that". (See: http://register.consilium.europa.eu/pdf/en/11/st07/st07206.en11.pdf)

well, 2011). Agri-environment schemes have a long track record and, by comparison, the Commission's generalised, broad-brush Pillar 1 greening approach is somewhat of a leap of faith. Its success will largely depend on the extent to which the ambition for greening is watered down as part of the political negotiations. The earlier discussion has identified some potential pitfalls that could render the greening plans little more than superficial 'green wash'. Combining this with a reduction in the Pillar 2 budget devoted to agri-environment measures is an outcome that would lead to a regression in environmental delivery and should be avoided at all costs. Monitoring will be critical to determining whether or not greening is working and to informed policy decisions on the future evolution of the policy.

Venturing into new territory can never be without its risks, however, and a period of experimentation with novel approaches may need to be accepted if the CAP is to evolve into a greener, leaner, more efficient policy instrument in the future.

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EUROPEAN UNION AGRO-ENVIRONMENTAL POLICY IMPACT FOR AGRICULTURAL LANDSCAPE CONSERVATION: THE CASE OF LEMON CULTIVATION IN NORTH-EASTERN SICILY

JEL classification: Q18

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Abstract. *This study analyses the effectiveness of the agro-environmental policies of the European Union for North-Eastern Sicily (Messina Province) where lemons have been harvested on terraces for hundreds of years. Since the latter years of the 1980s, there has been a gradual decline due to a drop in the value of lemons, an increase in labour costs and in non-agricultural use of land. Abandonment of farms has gradually brought about a deterioration in the agricultural landscape and given rise to erosion, due, principally, to the destruction of dry stone walls. The analysis is based on GIS photo-interpretations of the variations in cultivated areas and the consequent mutations of the agricultural landscape in a sub-area of Messina Province which was the subject of similar analysis in 1963. The results have highlighted that in the study area there has been a drastic reduction in the area under lemon cultivation. This continuing decline is likely to be difficult to reverse in the coming years because of negative average farm incomes. This negative trend in profitability has occurred despite the many legislative incentives for lemon farms. The results seem to suggest a revision of current strategies to protect agricultural landscape especially in the marginal rural areas of the European Union.*

Key words: *Landscape, CAP, AES, Sicily, Lemon*

1. Introduction

The evolution of the economics underlying the principles of globalisation has led to a slow but inexorable decrease in farm incomes. The most badly affected have been the micro and/or small farms which have difficulty competing in an ever-increasingly competitive system. Above all in sensitive areas, all these issues have aggravated the 'abandonment' phenomenon with the consequent deterioration of the environment and a loss of biodiversity (Coppola, Verneau, 1998; Knowler and Bradshaw 2007; Dallimer et al. 2009; Stoate et al. 2009).

In order to counter this situation, European policy for rural development has attributed growing importance to preserving rural areas and environment, above all in marginal areas at high hydro-geological risk (D'Amico, Sturiale L., 2001; La Via, D'Amico, 2008). Many studies have analysed and evaluated the benefits that the preservation of agricultural landscape can generate for a society which is becoming more demanding in terms of quality of life and protection of the environment (Fleischer, Tsur, 2000; Marangon, Tempesta 2001; Signorello *et al.*, 2006; Tempesta, 2006; Scarpa *et al.*, 2009).

The Common Agricultural Policy (CAP) which has been divested of its original protectionist components now favours a more multifunctional orientation to support farms which take on eco-compatible activities (Vieri, 2011). Numerous studies have analysed the impact of such policies both on farm incomes and in terms of land conservation and environmental protection (Hanley et al. 2007; Tranter et al. 2007; Acs et al. 2010; Bougherara and Latruffe 2010).

In the context of EU agricultural policies, agro-environmental protection is carried out via the two pillars of the CAP. The first of these, Single Farm Payments, introduced by EU regulation 1782/2003, offers financial support unrelated to production and allocated only if certain minimum norms for environmental welfare are maintained. Through policies for rural development (2nd CAP pillar), the EU has introduced other types of financial support which provide for farmers' voluntary participation in agri-environmental programs for conserving the environment, biodiversity, farm landscapes and organic produce. Agri-environmental policies are implemented within Rural Development Programmes (RDP) through 'Agri-Environment Schemes' (AES) whose aims are to conserve nature, protect the environment and manage the land.

Intense scientific debate surrounds these AESs to investigate their effectiveness in rural areas especially as regards marginal farms which are more likely to be abandoned, the consequent risks of hydro-geological instability and the loss of biodiversity (Concepcion *et al.*, 2008; Finn *et al.* 2009; Primdahl *et al.* 2010). Numerous studies have analysed the efficacy of such instruments by referring to various aspects linked to agri-environmental conservation such as the impact on conservation of biodiversity (Whittingham 2007; Turpin et al. 2009), traditional and quality farm produce (Aubry et al. 2005; Quetier, 2005) and protection of land against the risks of hydro geological instability (Hopkins and Holz 2006; Caballero and Fernandez-Santos 2009). However, the success of AESs depends on the effective participation of farmers who decide to volunteer according to numerous variables such as the economic and structural characteristics of farms (size and income), the farmer's qualifications and others (Toma and Mathijs 2007; Yiridoe et al. 2010).

With these in mind, this study analyses the efficiency of the agri-environmental policies in North-Eastern Sicily (Messina Province) where lemons have been harvested on terraces for hundreds of years, characterising, at the same time, the landscape of the Province of Messina both aesthetically and visually. In the past, this crop made a significant financial contribution as compared with others. Since the latter years of the 1980s, there has been a gradual decline due to a drop in the value of lemons, an increase in labour costs and in non-agricultural land use (Sturiale 1964; Sturiale, Pulvirenti 1981; Bucca 2006).

The abandonment of lemon farms has gradually brought about a deterioration in the agricultural landscape and given rise to erosion due, principally, to the destruction of dry stone walls (D'Amico 2011). The analysis is based on GIS photo-interpretations of the variations in cultivated area and the consequent mutation of the agricultural landscape in a sub-area of Messina Province which was the subject of similar analysis in 1963 (Sturiale 1964). The results can be referred to the entire area of the Lower Ionia Sea (Messina Province), in which the abandonment of the countryside has been the main cause of the recent natural disasters at Giampilieri and Scaletta Zanclea in 2009.

2. Normative context

Agri-Environment Schemes were introduced into Europe for the first time in Germany in 1985 as an agri-environmental policy independent of CAP, providing financial support for farmers who adopted practices which respected the agricultural environment.

EEC Regulation 2078/92 meant that AESs became accompaniments to the CAP Reform (1992), being adopted by all 12 member states. Due to their success, Austria, Finland and Sweden began applying them prior to their official EU entry (De Putter 1995; Deblitz and Plankl 1998; Buller 2000).

Subsequently, AESs became an integral part of Common Agricultural Policy for rural development first through EU Regulation 1257/99 and then through EU Reg. 1698/2005 which is current for the 2007-2013 CAP.

The main objective of AESs is to incentivate farmers to adopt agro-ecocompatible practises. In return they receive a financial reward to pay for the environmental services supplied to the community. Since the application of Regulation 2078/92, the adoption of such practises would, moreover, production surpluses which have often been the cause of commercial conflict between the EU and other international competitors (Scheele 1996).

Within the EU's rural development policy, AESs are based on the principle of subsidiarity and consequently are applied through specific agro-environmental programs. Some of these are applied on a vast scale, involving the entire agricultural area (AAU) of a region or state. In other cases AESs refer to specific areas with particular agro-environmental characteristics and as a consequence they are applied on a reduced scale. This is the case for '*Environmentally Sensitive Areas'* or more recently 'Stewardship Schemes' which are widely used in the United Kingdom and which, by means of the active involvement of local players and with simple transparent access rules, are applied to specific agricultural areas, with positive effects for conserving the agro-environment and rural areas (Hodge and Reader 2010; Nomura et al. 2010).

AESs must be subscribed to through a contract between farmers and the public administration in return for producing positive external effects with financial support to compensate for any additional costs, including any loss of earnings due to the application of agro-environmental measures.

Currently, measures for improving the environment and countryside (EC Regulation 1698/2005) are covered by Axis 2 of the Rural Development Programme (RDP). The objectives of this Axis are to conserve biodiversity, to safeguard agricultural systems with high naturalistic value, to protect water resources, to reduce greenhouse gasses and protect the countryside. These objectives are applied through numerous measures reported in *table 1*:

Tab. 1 - Financial Plan - programming period 2007-2013

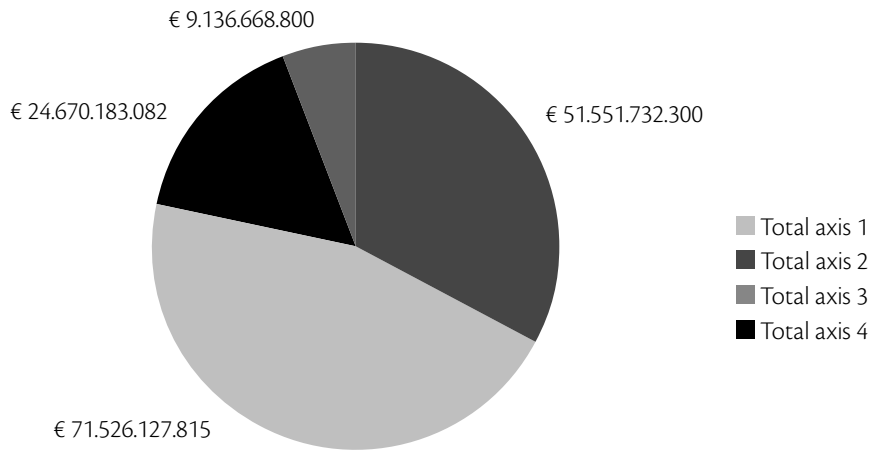
Measure		Total public expenditure	
		€	%
211	Natural handicap payments to farmers in mountain areas	10.825.867.962,99	15,1
212	Payments to farmers in areas other than mountain	11.858.853.270,21	16,6
213	Natura 2000 payments and payments linked to Directive 2000/60/EC	785.802.849,38	1,1
214	Agro-environmental payments	37.627.303.892,76	52,6
215	Animal welfare payments	1.022.874.226,61	1,4
216	Non-productive investments	1.087.687.082,31	1,5
221	First afforestation of agricultural land	3.410.115.308,95	4,8
222	First establishment of agroforestry systems	24.874.721,13	0,0
223	First afforestation of non-agricultural land	539.473.502,00	0,8
224	Natura 2000 payments	143.243.845,92	0,2
225	Forest-environment payments	415.723.572,68	0,6
226	Restoring forestry potential and introducing prevention	2.478.136.793,98	3,5
227	Non-productive investments	1.306.170.785,96	1,8
	TOTAL	**71.526.127.814,89**	**100,0**

Source: European Commission

The financial plan for the various measures in Axis 2 highlights that over 50% of resources goes to Measure 214 relating to Agri-Environment Payments, followed by Measures 212 and 211 relating to compensation for farmers in marginal areas and Natural Handicap Payments.

Overall, the Axis 2 Measures of the RDP amount to over €71M making it the most important Axis in financial terms over the period 2007 – 2013 (*graph 1*).

Graph 1 - Relative importance of axes within total public expenditure for the programming period 2007-2013 - EU27



Source: European Commission

On the whole, the measures for safeguarding the environment and rural areas have been activated right across the EU with a few differences depending on the economic and environmental characteristics of individual countries. *Table 2* shows a summary of the regional spread of measures of Axis 2 for 2007 – 2013 (EU 27).

As may be seen, that most widely adopted amongst the EU Member States is Measure 214 'Agri-Environment Payments'. The main objectives of this measure are to incentivate agri-eco-compatible practises aimed at producing organic products, safeguarding rural areas, especially in marginal areas at greater risk of hydro-geological instability, and conserving biodiversity. Farmers voluntarily subscribing to Measure 214 receive a financial reward for quality services to the community.

Another measure which has been implemented right across the EU is 212 '*Payments to farmers in areas with handicaps, other than mountain areas'* through which farmers in marginal areas and those with natural disadvantages receive financial support. The farmers' award is aimed at providing incentives not to abandon their farms but to keep them running.

Tab. 2 - Regional spread of measures of Axis 2 in the European Union programming period 2007-2013

Country	211	212	213	214	215	216	221	222	223	224	225	226	227	TOTAL
	Natural handicap payments to farmers in mountain areas	Payments to farmers in areas with h., other than mountain areas	Natura 2000 payments and payments linked to Directive 2000/60/EC	Agri-environment payments	Animal welfare payments	Non-productive investments	First afforestation of agricultural land	First establishment of agroforestry systems	First afforestation of non-agricultural land	Natura 2000 payments	Forest-environment payments	Restoring forestry potential and introducing prevention	Non-productive investments	
Belgium		√	√	√		√	√	√					√	7
Bulgaria	√	√		√					√			√		5
Czech Republic	√	√	√	√			√			√	√	√	√	9
Denmark		√		√		√	√				√	√	√	7
Germany	√	√	√	√	√	√	√		√	√	√	√	√	12
Estonia		√	√	√	√	√	√			√				7
Ireland		√	√	√										3
Greece	√	√	√	√		√	√		√	√		√	√	10
Spain	√	√	√	√	√	√	√	√	√		√	√	√	12
France	√	√		√		√	√	√	√		√	√	√	10
Italy	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**13**
Cyprus	√	√		√			√	√	√		√	√	√	9
Latvia		√	√	√					√	√		√		6
Lithuania		√	√	√			√		√	√	√	√	√	9
Luxembourg		√		√							√		√	4
Hungary		√	√	√	√	√	√	√	√		√	√	√	11
Malta		√		√										2
Netherlands		√		√		√	√							4
Austria	√	√	√	√	√		√			√	√	√		9
Poland		√		√			√					√		4
Portugal	√	√	√	√		√	√	√	√	√	√	√	√	12
Romania	√	√		√			√							4
Slovenia	√	√		√										3
Slovakia	√	√	√	√	√		√			√	√	√		9
Finland	√	√		√	√	√	√							6
Sweden		√		√		√							√	4
United Kingdom		√		√	√	√	√		√		√		√	8
TOTAL	**14**	**27**	**14**	**27**	**9**	**14**	**20**	**7**	**12**	**10**	**14**	**16**	**15**	**199**
Index of national spread (%)	51,9	100,0	51,9	100,0	33,3	51,9	74,1	25,9	44,4	37,0	51,9	59,3	55,6	

Source: European Commission

3. Methodology

This work was inspired by previous research into Sicily's Lower Ionean Sea (Messina Province) in the mid 1960s (Sturiale, 1964). To be able to compare the data, this work studied exactly the same area, covering 1,040 hectares, located in Messina Province and including the villages of S. Teresa di Riva, Savoca, Furci Siculo and S. Alessio Siculo (*figures 1 & 2*).

Fig. 1 - Research area - 1964 map

Location of the area under lemons on the southern Ionic coast of the Messina area

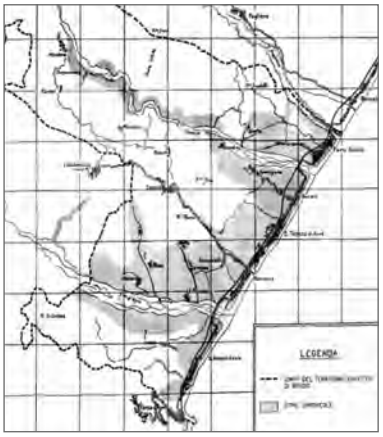
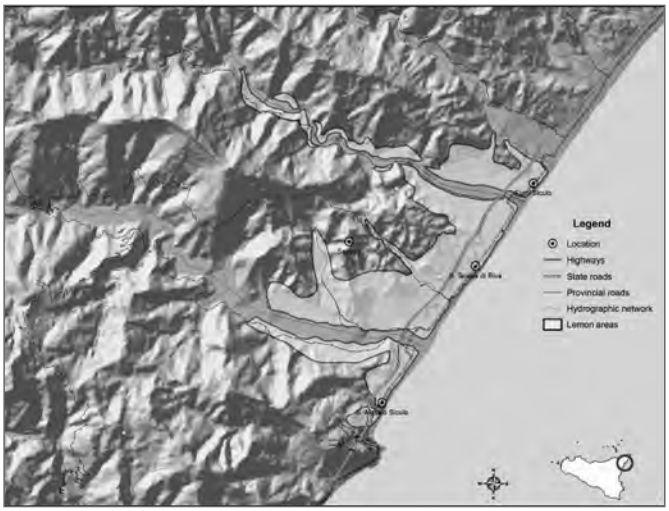


Fig. 2 - Research area - GIS map



Starting off with Sturiale's analysis, we compared the extent of lemon groves in the 60s with that of today. The analyses were carried out by a detailed study of photointerpretive techniques[1]. Digital orthophoto mapping was used which has the great advantage of being adaptable to horizontal projection[2]. Furthermore, orthophotos can easily zoom in on details or zoom out for an overview thus drastically saving time (Chirici, 2005) and significantly increasing the reliability of interpretation[3].

Orthophoto mapping was applied to three different data levels: observational, visible spectrum and degree of detail as follows:

– colour digital orthophotos from flight ATA2008 of Gauss-Boaga Fuso EST coordinates (nominal scale 1:10.000, resolution 25cm/pixel) available at http://www.sitr.regione.sicilia.it (SITR: regional data system).
– colour digital orthophotos IT2000 of Gauss-Boaga Fuso EST coordinates (nominal scale 1:10.000, land resolution less that 1 metre) (SITR);
– Black and white orthophotos 1994 (nominal scale 1:25.000) available at http://wms.pcn.minambiente.it (Ministry for the Environment).

Apart from orthophotos, numerous other geographical references were used:

– Regional Technical Map (raster) 1:10.000;
– IGM map (raster) 1:50.000
– Regional Technical Map of Administrative Borders;
– Hydrographic Network within the Welfare Plan for Regional Sicilian Waters;
– Tele Atlas roadmap;

[1] Photointerpretation is an investigative tool which makes it possible to extract data from aerial photographs (Guidi, 1978). They are based on spectral and geographic parameters (tone & colour, shape, size, shade and shadow, texture, structure and associated particulars) and develop over the subsequent phases of characterisation, identification, classification and deduction. This information is then managed by a GIS (Geographical Information System (Burrough, 1986).

[2] This property enables the videoing of orthophotos at one scale and the superimposing of other data types on the same mapping system (Ioannilli, Schiavoni, 2002).

[3] The GIS surveys were run with ESRI ArcMap 9.2 and projected in Gauss-Boaga/UTM East Zone.

– DEM (*Digital Elevation Model*) Sicilia, 20m x 20m base units.

These supports proved useful not only for the photointerpretive phase but even more so for helping produce the final maps.

The colour orthophotos can be videoed up to a scale of 1:2.000 maintaining optimum geometrical and spectral resolution. An expert photointerpreter can also easily distinguish many land and plant details in them. Usually, shadow is limited and so most details can be easily classified (Amadesi, 1975). Furthermore, shots taken at different times can highlight changes in land use and clarify any shaded areas (shadows, imperfect image etc.) in any one of the photographic supports.

The main evaluation parameters were:

– photo weaving (microscopic changes in colour tone);
– structure (microscopic changes in colour tone);
– general context.

The next phase of attributing thematic classes was carried out visually by the photointerpreter (traditional or manual type) (Lillesand, Kiefer, 2003; Franklin, 2001)[4]. Furthermore, to reduce the bulk of work needed to analyse all the objects, given the small segmentation scale, an automatic classification estimate was carried out, followed by a dissolve phase to eliminate adjacent polygon borders (ESRI, 2006).

4. Results

The original research (Sturiale, 1964), upon which this research is based, facilitated analysis of how the lemon crop evolved in the area from 1963 to 2010.

Orthophoto analysis helped define, identify and summarise six class types reported on maps which represent the 2008 status of the lemon crop:

1. Productive lemon orchards (regular orchard set-up, intense green trees etc.);
2. Abandoned lemon orchards (irregular orchard set-up, crown is no longer globe-shaped and varies in size etc.);
3. Abandoned lemon orchards which are partially renaturalised (visible co-existence with other trees and shrubs etc.);
4. Abandoned areas which were orchards in the past (mostly nude areas where only a few signs of the orchard remain etc.);
5. Urbanised areas;
6. Other areas (everything not described above).

Having identified the class types, the next step was to verify the productive lemon orchard surface area (*table 3*) and map it. In total it amounted to 107 hectares, 10,3% of the area identified in the 60s. As regards the other classes, the photointerpretive analysis of the area identified 223 ha of 'abandoned lemon orchards' (21,5% of the total), 223 ha of 'partially renaturalised lemon orchards' (21,5%), 77 ha (7,4%) of past orchards, 213 ha of urbanised areas (20,5%) and 197 ha (18,9%) in class 6.

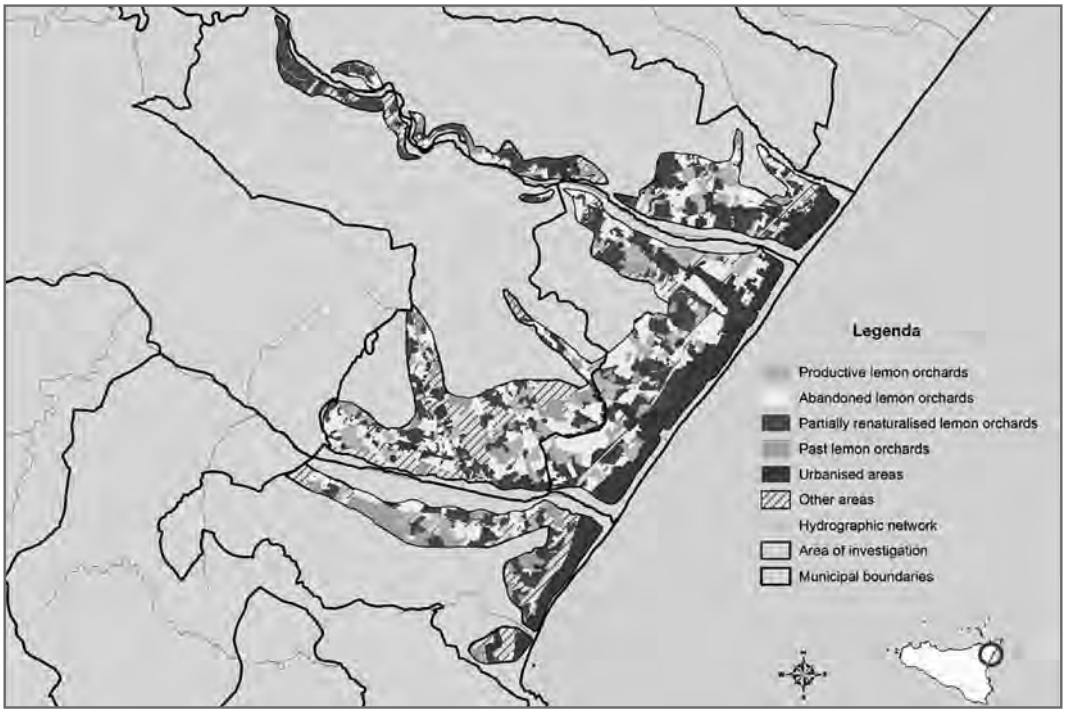
[4] Thematic classes can be attributed either manually or semi-automatically. Nevertheless, the accuracy of certain classification algorithms is still not up to direct use.

Tab. 3 - Class break-down of surface areas		
	Surface areas	
	hectares	%
Productive lemon orchards	107	10,3
Abandoned lemon orchards	223	21,5
Partially renaturalised lemon orchards	223	21,4
Past lemon orchards	77	7,4
Urbanised areas	213	20,5
Other areas	197	18,9
TOTAL	**1.040**	**100,0**

Source: European Commission

The results of the photointerpretive analysis and locations of the class types is shown in *figure 3*. These results highlight a highly critical situation with the gradual disappearance of lemon cultivation which is progressively replaced by returning to its natural state of spontaneous growth, (a phenomenon not necessarily positive). Moreover, the disappearance of the lemon is often due to tough competition with alternative non-agricultural land use especially urbanisation. In this way not only the hydro-geological equilibrium of territory is at risk, but also the specific characteristics of agricultural landscape suitable for lemon farming. These changes are consequently unsettling in an area where for centuries the lemon was a social, historical and cultural focal point, strongly characterising the landscape from the aesthetic and visual point of view.

Fig. 3 - Photointerpretation of the study area (2010)



5. Discussion and policy implications

The decrease in areas planted with lemon in the area under study came about despite European Regulations for the protection of the agricultural landscape (Regulations EEC 2078/92, EU 1257/99 and EU 1698/2005). In the study area, the application of these Regulations has occurred through the following programs:

– The Environmental Programme (EEC Regulation 2078/92).
– The Rural Development Programme for Sicily 2000-2006 (EU Regulation 1257/99).
– The Rural Development Programme for Sicily 2007-2013 (EU Regulation 1698/2005).

Below we chart the various Measures of the Rural Development Programmes for protecting rural areas and the agri-environment that have been applied or are ongoing in the study area (*table 4*).

Tab. 4 - Main measures for protecting rural areas and the agri-environment applied in the Messina Province

Program	Measure	Action	Financial support	Minimum farm surface (ha)
Environmental Programme: Reg. 2078/92	A1 - Pesticide reduction		603 ecu/ha	1 ha
	A2 - Organic agriculture		1208 ecu/ha	1 ha
Sicilian Rural Development Programme 2000-2006	F - Agri-environment	F1a - Organic production methods	600 €/ha	1 ha
		F1b - Organic agriculture and animal husbandry	850-900 €/ha	1 ha
		F3 - Landscape restoration and maintenance	600 €/ha	1 ha
Sicilian Rural Development Programme 2007-2013	214 - Agri-environment payments	214/1A - Eco-sustainable farm management	450 €/ha	2 ha
		214/1B - Organic agriculture and animal husbandry	750-800 €/ha	2 ha

Source: RDP of Sicily

As highlighted, over the last twenty years rural development policies activated in the EU have attributed great importance to conservation of agricultural landscape in the rural areas.

Nevertheless, analysing the evolution of the surface area dedicated to lemon cultivation, there has been a drastic reduction over the last 50 years, of 82% (*table 5*). Particularly over the past

Tab. 5 - Breakdown of the area dedicated to lemon cultivation in the study area

Villages	1963 (*)		1980 (**)		2000 (**)		2010	
	hectares	% change	hectares	% change	hectares	% change	hectares	% change
S. Teresa Riva	250	100	139	-44	58	-77	44	-82
Savoca	140	100	163	16	123	-12	32	-77
Furci Siculo	120	100	384	220	88	-27	18	-85
S. Alessio Siculo	90	100	85	-6	61	-32	13	-86
TOTAL	**600**	**100**	**771**	**29**	**330**	**-45**	**107**	**-82**

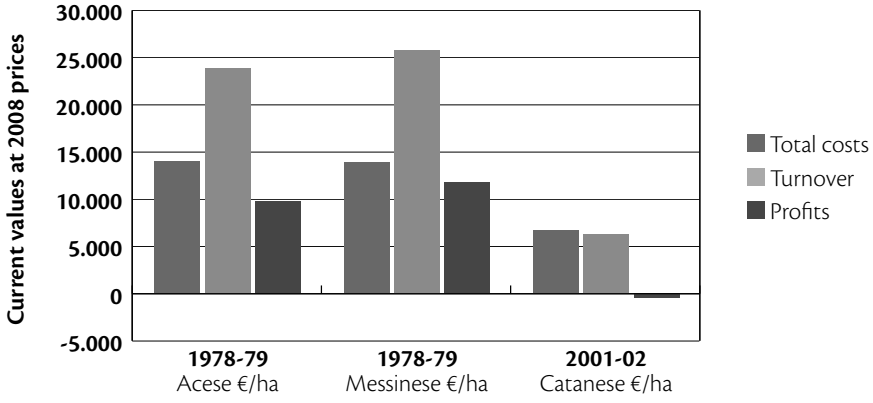
(*) Sturiale C, 1964
(**) ISTAT - III & V General Census of Agriculture

decade, despite the implementation of the RDP, the lemon area cultivated in the villages of the study area has decreased from 330 to 107 ha.

The reasons behind this collapse are mostly attributable to reduction of RDP measures applied in the study area for safeguarding the lemon landscape. Currently only the Measure 214 "Agri-environment payments" is applied, with financial support of 450 €/ha (Action 214/A) and 750-800 €/ha (Action 214/B). No other measure of RDP has been applied or is on going in the study area for lemon landscape conservation. Furthermore, to qualify for benefits from the RDP, the minimum area of the farm holdings currently is 2 ha more than in the past, when the minimum surface was 1 ha.

In the last thirty years there has also been a collapse in income for lemon growers. So, looking again at the figures of previous Sicilian economic research regarding the incomes of lemon farms[5] and converting the results into 2008 prices: profits fell from 11.824,82 euro/ha in 1978 to –467,84 euro/ha in 2008 (*graph 2*).

Graph 2 - Trend in profits of lemon farms in Sicily over the last thirty years



Source: our calculations on data from the Annuario statistico italiano, 2009; Tavola 22.12.
Source: Sturiale, Pulvirenti 1981; Bucca 2006

These economic results show clearly that despite the significant potential in terms of policy support, lemon cultivation in the study area seems to be irredeemable in landscape and environmental terms. The total lack of any income from lemon farming around Messina has caused an irremediable reduction in the surface areas cultivated.

The results of the study can be extrapolated to the entire area of North-Eastern Sicily (Messina Province). In this area, the total surface dedicated to lemon cultivation in 2000 was 3.844,73 hectares. If we compare the Utilised Agricultural Area (UAA) between 2000 and 1980, we note a significant decline (-44,92 %)[6] due to the decrease in income for lemon growers and the scarce effectiveness of agri-environmental Measures (*table 6*).

[5] Sturiale, Pulvirenti, 1981, Bucca, 2008.

[6] The official data of the 6th Agricultural Census (2010) are not yet available, but it is easy to predict further decline of the area planted with lemon due to the current economic crisis that is affecting the entire agricultural sector.

Tab. 6 - Class break-down of the surface area dedicated to lemon cultivation in Messina Province

Year (*)	surface area dedicated to lemon cultivation								Total	
	< 1		1 - 2		2 - 5		> 5			
	ha	%	ha	%	ha	%	ha	%	ha	%
1980	1.335,64	19,1	964,84	13,8	1.384,26	19,8	3.295,10	47,2	6.979,84	100,0
2000	1.143,63	29,7	575,99	15,0	727,60	18,9	1.397,51	36,3	3.844,73	100,0
Var. % (2000 / 1980)	**-14,38**		**-40,30**		**-47,44**		**-57,59**		**-44,92**	

(*) ISTAT - III & V General Census of Agriculture

If, moreover, we observe the class break down of the lemon holdings in Messina Province in the same period (1980-2000) we can note that the number of lemon holdings fell (-22%). Furthermore, in 2000 about 80% of lemon holdings were less than 2 hectares and consequently could not qualify for benefits from the RDP (*table 7*).

Tab. 7 - Class break-down of the lemon holdings in Messina Province

Year (*)	number of lemon holdings								Total	
	< 1 ha		1 - 2 ha		2 - 5 ha		> 5 ha			
	ha	%	ha	%	ha	%	ha	%	ha	%
1980	7.213	61,1	2.085	17,6	1.524	12,9	992	8,4	11.814	100,0
2000	5.370	58,3	1.937	21,0	1.241	13,5	665	7,2	9.213	100,0
Var. % (2000 / 1980)	**-25,6**		**-7,1**		**-18,6**		**-33,0**		**-22,0**	

(*) ISTAT - III & V General Census of Agriculture

6. Conclusions

Lemon growing in Sicily takes up a considerable amount of agricultural land along the coast and is closely linked with the landscape imagery of non-residents. Nevertheless, the last fifty years has seen a progressive decline in lemon growing which has led to the disappearance of most lemon farms and a huge reduction in the surface area cultivated. This has happened despite the EU's agri-environmental policy which, in the last twenty years, has tried to reverse this negative trend through numerous measures which are potentially applicable to the lemon holdings in the Messina area.

The results of the study inspired by previous research (Sturiale, 1964), have, through photointerpretation, shown that in the study area there has been a drastic reduction in the area under lemon farming, which is currently about 107ha as opposed to the 600ha of 1963.

A negative trend in profits has occurred despite the many legislative incentives for lemon farms (Regulations 2078/92, 1257/2003, 1698/2005).

At the same time in the entire area of North-Eastern Sicily in Messina Province, where lemons have been harvested on terraces for hundreds of years, the area of lemon cultivation and the number of lemon holdings have decreased dramatically, by -44,92% and -22% respectively. This ongoing regression is likely to be difficult to reverse in the coming years because of low average farm incomes (€-468/ha).

The reasons behind such a 'failure' may be found in the economic size unit (ESU) of lemon farms which generally is smaller than the minimum surface necessary to access benefits from the RDP measures. Currently, at least 80% of lemon holdings in Messina Province cannot qualify for benefits from the RDP.

At present there is no project for rural areas, encompassing the economic, social and environmental issues, which envisage an overall strategy for the agricultural landscape, dovetailed with territorial planning. For this reason the results seem to suggest a revision of current strategies and measures, perhaps referring to other models such as for example, collective action for stipulation of agreements between farmers or strengthening the role of local partnership (e.g. Local Action Group as in the Axis 4 of RDP - Leader Approach). Furthermore, less restrictive conditions for access to agri-environmental Measures (e.g. minimum farm surface) can help to safeguard lemon landscape conservation.

Nonetheless, the question remains open as to whether society would benefit from conserving the lemon orchard landscape around Messina, since every conservation policy has a cost to society (Cicia, D'Amico, Pappalardo 2010). In this regard, the 'Safe Minimum Standard' (SMS) (Ciriacy-Wantrup 1952) approach is to conserve the farm landscape with specific initiatives as long as they are socially acceptable (Bishop, 1978). From this viewpoint, defining new models for governing the territory would seem laudable and might contribute to restoring and conserving the lemon farms around Messina which today seem irremediably destined to a rapid and irreversible decline from a landscape, economic and social points of view.

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THE EU FRUIT AND VEGETABLE SECTOR IN THE POST 2013 CAP SCENARIO[1]

JEL classification: Q18, Q13, L22, L42

Crescenzo dell'Aquila and Gaetana Petriccione*

Abstract. *The current debate on the role of Producer Organizations (POs) for the fruit and vegetables (F&V) sector of the EU focusses on a changing competitive environment, with price instability and downward pressure on producers' margins. With the aim of analysing perspective improvements of the common market organisation (CMO) for F&V in the new CAP, the article discusses the main structural changes affecting the F&V supply chain and the results of a recent survey on the implementation of the CMO reform of 2007 in the sector. Proposals for possible improvements in PO's performance are examined, with special reference to the implications of contracts and competition policy, in shaping the role played by POs, their effectiveness in rebalancing the bargaining power of F&V producers and in stabilizing prices and income. Among the key measures provided by the current CMO, the article analyses in depth the performance and limitations of the package devoted to market risk and crisis management.*

Keywords: *fruit and vegetables, CAP, supply chain, producer organizations, vertical coordination*

1. Introduction

The Fruit and vegetable sector (F&V) presents particular characteristics on the agro-food scene due to the perishable nature of its products and their strong vulnerability to weather changes. These, alongside changes in consumption patterns and in market power along the supply chain can lead to important effects on producer prices and incomes even with "normal" fluctuations in crops.

Until the last reform of the Common Market Organisation (CMO) for F&V, specific market measures (withdrawals, entry price schemes and export subsidies) guaranteed a certain stabilization of prices and income in the F&V market. The role played by producer organizations (POs) since the 1996 CMO reform, through the use of operational programs, also contributed to improving adaptation of supply to demand and producers' margins. Nevertheless, the sector suffers frequently recurring market crises, reflected in the wider range of tools for crisis management provided to POs through the 2007 CMO reform. This last reform also provided for the integra-

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[1] This paper draws upon a recent study prepared by INEA for the EU Parliament and is a joint effort of C. dell'Aquila (INEA) and G. Petriccione (INEA). Sections 2, 3 and 4.2 were drafted by C. dell'Aquila, sections 4.1, 4.3 and 4.4 were drafted by G. Petriccione, Introduction and Conclusions are shared. The authors wish to remember Prof. A. Cioffi (Univ. of Naples), and thank Prof. J.M. Garcia Alvarez-Coque (Univ. of Valencia), Dr.ssa M.A. Perito (Univ. of Teramo) and Dr. R. Solazzo (INEA) for contributing to the original study (EU Parliament, 2011).

tion of the F&V into the single payment scheme and moved the sector further towards market orientation, with increased exposure to market fluctuations.

EU experience in the F&V sector has demonstrated the key role played by POs in rebalancing bargaining power and stabilising prices and income through concentration and planning of F&V supply. For this reason, in the post-2013 CAP scenario, the EU Commission is proposing to maintain the existing support framework based upon POs and operational programs in the new Single CMO regulation. Taking into consideration both the impacts of the 2007 reform of the F&V CMO and the strategic issues for F&V market measures within the post-2013 CAP, the paper investigates current features and plausible improvements of the support system to F&V producers and POs in the light of the recent EU Commission's proposals for CAP reform.

The paper is arranged in three sections concerning: *i*) a brief overview of EU F&V market and supply chain dynamics; *ii*) an assessment of the impact of the F&V CMO measures, as a result of the INEA survey on opinions and proposals from POs on the review of regulation; *iii*) a profile of domestic market measures as strategic issues of the F&V CMO within the Post 2013 CAP.

2. Dynamics of F&V supply chain and producers' income

The current picture of the European F&V sector is strongly affected by long-term changes in the structure of the global F&V supply chain, related to: a) consumers' increasing demand for services, including convenience in food purchasing and preparation, taste, variety, and consumers' increasing demand for food safety and quality; b) sales controlled by fewer and fewer retailers with growing bargaining power, which in turn encourages tendency to concentration and consolidation also in upstream stages of supply chains; c) the increasingly important role of the WTO and bilateral trade negotiations in widening competition, due to on-going trade liberalization and domestic policy reforms related to trade liberalization; d) expansion of the activities of multinational agribusiness due to upgrading of communication, information technology and transport, enabling fresh products to be transported from many origins and due to a related increase of trade and investment, consolidation, and foreign direct investment (FDI) in many countries (often developing countries) are suppliers to the EU market (EU Parliament, 2011).

F&V is, however, still a key sector in EU agriculture, with a weight of about 18% of the value of EU agricultural production and a high geographic concentration, as the two main producing countries, Italy and Spain, account for 40% of vegetable production and more than 50% of fruit (including citrus). The dynamics of EU production, as well as its weight in the worldwide picture, suggest that, in global terms, the sector has been slightly shrinking over the last decade. In terms of trends, producer prices also show a general pattern which is stable or slightly declining. However, in the short-run, the picture is different, as producer prices have always been rather volatile for fresh F&V, with sharp declines in prices that usually follow phases of growth in production and anticipate its downturn. Production variability and price fluctuations, therefore, have to be understood in two different dimensions: in the short-run, they are typical features of the functioning of the F&V sector, mostly due to weather variability and some structural characteristics of the sector, such as product perishability, fragmentation of production decisions, or the high concentration of production in few regions which influence the whole European market. Perishability makes market imbalance potentially very onerous to producers because it fuels a high responsiveness of producer prices to the quantity being sold (CFEPSR, 2009). In the longer run, a declining trend in production and prices depends on the previously mentioned long-term

changes in the functioning of world markets for F&V and supply chains (EU Parliament, 2011).

Even more than producer price volatility, the dynamics of production costs and marketing margins should be investigated in order to gain a better understanding of negative income dynamics. Against the weakness of the long-run dynamics of producer prices in the last few years, retail prices show a pattern which is either constant or increasing, indicating either increasing rents being captured by downstream actors or increasing levels of value added generated at downstream stages of the supply chains (EU Parliament, 2011). F&V in the EU are grown mainly by small farmers, with a great number of suppliers mainly in Southern EU regions. This causes higher costs for many farmers, not allowing an efficient scale of production to be reached, and poses limits on competitiveness on an open market. A number of suppliers call for a number of intermediaries to intervene at various stages. The complexity of this type of chain implies structural inefficiencies often coupled with low productivity of different actors in the chain (Petriccione et al., 2011).

Changes in food retailing bring about a tendency to exclusion of small independent shops, small enterprises, and small farmers from on-going developments. In order to function effectively these dominant retail players have to organize production, processing, logistics, trade, and distribution of numerous other players. The major effects of the emergence of food retailers in the global food supply chains are through the procurement system of large volumes of products from suppliers. Competition from both small retail shops and other forms of retail (i.e. food-away-from-home farmers' markets, street sellers, etc.) provides incentives for cutting costs and raising quality and diversity. Cutting costs in turn requires the improvement of all aspects of procurements, including product and transaction costs. This is done by improving coordination and logistic systems with distribution centers, logistics platforms, cold chain development, contracts with wholesalers and producers, and private standards specifying quality, safety, volume, and packaging of products (Bazoche et al., 2005; Green, Schaller, 1996; Sans, Coquart, 1998). Distribution centers imply an increase in the scale and volume of procurement, which tends to lead to product procurement from large areas, in higher volumes, and to serve a number of stores, working with suppliers whose scale, capital, and managerial capacity are sufficient to meet the requirements of the new procurement system. The scale of larger supermarket chains gives them the capacity to pursue the above objectives, since they have the bargaining power, the finance to make investments in logistics, and the geographical presence required.

Processes of concentration and consolidation driven by large retailers are also affecting upstream of F&V supply chains. Large retailers build up long term relationships with key suppliers – either producers or wholesalers - capable of meeting the requirements necessary to respond to the increased consumer interest for purchasing fresh F&V products from supermarkets. Suppliers are in turn required to make larger investments deemed to be worthwhile if they can get on a retail chain procurement list. This restructuring process has taken place in recent decades in the wholesale sector with a concentration and internationalization of wholesale and logistics platforms (e.g. Mercabarna in Spain, Rungis and Perpignan in France, etc.) (Marotta-Perito, 2000).

Along with changes in consumer choice, such processes will continue to shape the future of the F&V economy in the EU and will deepen as the sector becomes more globalized and interconnected. Moreover, it also true that the asymmetry in bargaining power puts upstream actors under unfair trading practices, with larger and more powerful actors who require contractual arrangements to their advantage, either through better prices, late payments or through improved terms and conditions (EU Commission, 2009b).

Effects of structural changes can be detected also when observing changes in the trade pat-

tern of the EU F&V sector showing a growing space for external providers on the EU market. Although in aggregate, increasing imports seem to go hand in hand with the growth of the EU market and trade, increased openness to external trade permits further supplies from non-EU operators, capable of meeting demand and retail requirements stemming from globalized supply chains.

Non-EU suppliers of vegetables on the EU market are mainly from the Mediterranean area, but also from Central-South America and some African countries, while Central and South America prevail for fruit (particularly because of the role played by tropical and off-season F&V products), although with a significant role of Mediterranean countries for some products, such as citrus. Survival of traditional marketing channels in the EU market, structural backwardness of non-EU suppliers, and EU trade policy devices, converge in determining a relatively slow pace of inclusion of external F&V suppliers in the EU-based supply chains for F&V (EU Parliament, 2011).

The bias against small farms favours forms of association at farm level stage. Collective action at producer level and effective coordination within the chain appear to be pre-conditions for any successful strategy in coping with declining relative producer prices and the gap between farm and retail prices. Moreover, forms of producer organization should continue to be encouraged as an effective way of increasing collaboration between growers and other members of the supply chain and developing partnerships around shared interests in cost reduction, quality upgrading and risk management.

3. The impact of the F&V CMO measures: a survey

A survey concerning opinions and proposals of POs on the F&V CMO provides some first evidence of the impact of the 2007 reform and a map of issues for plausible improvements. The survey has been run in Italy, Spain and France[1] with a questionnaire covering themes spanning from impacts of CMO measures and trade policy to POs' opinions and suggestions about new aid schemes for the sector. Answers are summarized in Table 1 and briefly discussed below.

3.1. An assessment of the 2007 CMO

The 2007 reform of the F&V CMO stated as broad objectives to be pursued: a) improving the competitiveness and market orientation of the F&V sector; b) reducing producers' income fluctuations resulting from crises; c) promoting F&V consumption, as a contribution to healthier food habits; d) enhancing environmental safeguards in cultivation and production techniques.

The effectiveness of the CMO provisions[2] in pursuing those objectives was recognized by a very high percentage of POs assessing the CMO's approaches to to "improve the attractiveness of

[2] The survey is part of a wider work carried out for the EU Parliament (2011). In Italy it concerns a fairly representative sample of 74 POs placed in all relevant F&V producing areas. The sample has been chosen taking into account POs' dimensions (large, medium, small) and their territorial localization. In Spain it concentrates on the region of Valencia (30% of the Spanish POs and strong concentration of citrus fruit) with 9 interviews to an APO significant on the EU scale for citrus trade and POs of different dimensions. France is covered by interviews to 2 large APOs in the Loire region.

[3] They are: product range of a producer organisation; the extent of direct sales permitted; the extension of rules to non-members; permitting APOs to carry out any of the activities of their members; permitting the outsourcing of activities; more incentives to mergers of POs, APOs, etc.; more incentives to regions where the level of concentration of supply through POs is particularly low.

POs", "increase concentration of supply", and "improve competitiveness". In the Italian case the much wider collection of answers indicates a particularly high percentage of positive answers in the class of POs labeled as of medium dimension (between 20 and 100 Meuro of value of marketed production (VMP)), while the Spanish case is the one where the consensus is relatively weaker.

In all three countries the effectiveness for the pursuit of "producers' income stabilisation" and "strengthening of producers' negotiating capacity" was less strongly acknowledged by POs. In the Italian case, the lower percentage of POs considering 'significant' the effects of the 2007 CMO on both objectives derives from the negative answers of all the large POs (more than 100 Meuro of VMP). These as explained below, are also those with a larger use of stabilisation measures. Italian POs believe that the current tools of the F&V CMO have only partially responded in positive terms to the issue of increasing and/or stabilising producers' income. This is related to the latest market crises, for which many factors influencing market dynamics and affecting its variability have increased pressures on farmers' returns.

Along with these criticisms, the above results may suggest the hypothesis that negative answers from bigger POs could relate to their nature as very advanced entrepreneurial segments that, on their own account, satisfactorily achieve some of the objectives of the CMO.

The effectiveness of Operational Programs in reaching the objectives stated in the reformed CMO is widely recognized among Italian, Spanish and French POs. Most POs from all the three countries (85% and above) consider 'significant' or 'very significant' the effectiveness of actions aimed at planning of production, improving/maintaining product quality, improving marketing. Types of action connected with the environment also receive favourable judgements.

A lower percentage of positive opinions has been expressed for crisis prevention and management measures, particularly by the two French APOs. In Italy, only 47.5% of POs gave positive opinions. Finally, the judgments on actions related to research and experimental production, as well as training, are clearly negative. This holds for all three countries, with the partial exception of a Spanish APO ranking research at the top. In Italy the opinions of about 80% of POs interviewed consider these actions poor or not significant. Basically, very few POs consider investments in research and training as a component of long-run strategies better to cope with market change.

Looking in more detail at the analysis of the *performance of crisis prevention and management measures*, in all three contexts POs believe that current Cpm measures are not completely effective (too rigid in their implementation, therefore not quite adequate to cope with crisis) and have turned out to be too complex to manage. However in all three contexts the number of POs adopting them has been increasing between 2008 and 2010. Italian POs adopting Cpm measures have largely focused "on promotion and communication" (72% of them adopted such measures in 2010), followed by "market withdrawals" (31%) and "harvest insurance" (17%). The much wider collection of answers of Italian POs indicates that adoption of Cpm is more frequent with larger POs and among POs selling on foreign markets. In the Spanish sample "market withdrawals" prevails on "promotion and communication" and "green harvesting". In France, for the two APOs interviewed, "harvest insurance" fared better than "promotion and communication".

All in all, "Promotion and communication" are by far the most popular measures of risk and crisis management among Italian POs and they fared quite well also among Spanish and French POs. This is probably due to the fact that the measure is the easiest to implement. The issue of the complexity of these measures could also be an explanation why large and medium POs adopt them much more than smaller ones: POs better structured, as well as better endowed with

managerial skills find adoption less difficult. This is somehow a paradox, since smaller POs are supposed to be more vulnerable to the effects of market risks and crises.

3.2. Towards 2020

The widespread positive global opinion on the current CMO expressed by POs has obviously been translated into a favourable judgement for continuing the various instruments of support in the post-2013 CMO for F&V.

Almost all POs are in favour of continuing *operational programs* (93.4% in Italy, 100% for the Spanish and French POs interviewed), because these are considered an essential instrument for favoring growth processes in the sector, as well as "the sole effective instrument of aggregation able to guarantee the competitiveness of the F&V sector". The vast majority of POs ask for an increase in the current support to POs in order to improve the concentration of F&V supply[4]. At the same time they deem it necessary to maintain or increase the current additional support to mergers of POs, APOs, also in those regions with a particularly low level of supply concentration. Actions that encourage quality improvement, production planning, environmental programs, marketing, and crisis prevention and management should be enhanced.

The percentage of POs asking to keep (and strengthen) *crisis prevention and management measures* is very high (80.3% in Italy, 100% for the Spanish and French POs interviewed), although the feeling of many POs on the effectiveness of risk and crisis measures implemented so far is rather sceptical. Revisions of the set of measures are suggested by the large majority of POs interviewed: introducing further and more powerful safety net mechanisms, including revenue or income stabilization programs (Italy and Spain); increase of withdrawal indemnities (Italy and Spain); the adoption of facilitating measures (all), elimination of green harvesting (Italy), increase of funds for the entire set of measures (all).

Interestingly enough, the prospect of carrying on the *single payment scheme* of support elicits a variety of opinions. Although answers are generally in favour of maintaining the scheme, the Italian case shows only 45.1% of POs in favour, while 17.6% suggest its reduction and 37.3% its removal. Also some Spanish POs proposed the elimination of the scheme. Summarizing the wide range of (not always clear) reasons stated by POs, a sense of scepticism emerges about the impact of this instrument. While the function of income support of the scheme is appreciated, concerns are raised about possible negative impacts on the adjustment of production and farm structures, discouraging , in particular, the pursuit of product quality.

Finally, a general orientation of POs from the three countries towards consider too lax the current EU *trade policy for F&V* should be underlined, as well as the exproession of concern about the effects of further trade liberalization. In the Italian case, 70,5% of POs consider trade protection not effective for the purpose of stabilizing prices or income, 65,6% do not consider POs able to gain from trade liberalization and 83,6% feel that dismantling what is left of the trade barriers could imply import surges and domestic price instability. Among the reasons motivating these answers the major role is played by "unfair" competitive advantages of competitors exploiting differences in labour, sanitary, quality and environmental standards. Splitting the sample reveals that concerns of POs about trade liberalization are higher than the average in the case of small POs and, above all, in the case of POs not engaged in export practices, while large/medium POs and POs with important shares of foreign sales are more favourable than the average. Also a dif-

[4] Some Italian POs also stressed the need for improving F&V chain organisation also through the specification of collective contracts.

ferentiation of POs by marketing channel provides a picture in which POs most engaged in the role of supplier to big retailers are also those most concerned about possible dismantling of trade protection, while POs with weak or inexistent links with modern distribution are less concerned than the average about further liberalization. Probably the latter, by selling almost all their produce to wholesale markets, small retail stores and processors, have a less strong perception of the presence of foreign competitors than those POs struggling to stay in the procurement list of big retail chains that have a global view on procurement.

Tab. 1 - Synthesis and comparison of the results

	Italy	Spain	France
1. Implementation of reformed F&V CMO: ***objectives and measures***	A widespread positive opinion of the effectiveness of provisions, especially of those regarding the improvement of POs' attractiveness, F&V supply concentration and competitiveness in the F&V sector	Favourable evaluation of provisions for widening the product range and providing incentives to mergers. Effectiveness is also recognised for concentrating supply in regions where concentration is low.	Positive evaluation of the effectiveness of provisions for improving the attractiveness of POs and increasing the concentration of the F&V supply. Criticisms have been raised about the frequency of administrative controls, considered as overshooting the real needs.
2. Implementation of reformed F&V CMO: ***operational programs***	Very positive judgement. Planning production, improving product quality, marketing, and environment are considered effective actions. Crisis management within operational programmes is also well considered, even if too rigid in its implementation.	Very positive opinion. Planning production, quality improvement, environment and marketing are considered effective actions. Crisis management within operational programmes is also well considered.	Very positive opinion. Planning production, quality improvement, and marketing are considered effective actions. Environmental actions positive, but less effective. Crisis management within operational programmes is also well considered, although still too weak in terms of effectiveness.
3. Implementation of reformed F&V CMO: ***crisis prev. and management meas.***	Within crisis measures "promotion and communication" is the most adopted measure, followed by market withdrawal and to a lesser extent by harvest insurance.	Most of the firms surveyed consider that operational programs must continue including crisis prevention and management measures. Predominance of market withdrawals and wide use of the 0.5% of additional budget.	Most of the firms surveyed consider that operational programs must continue including crisis prevention and management measures. The measures most adopted are , "promotion and communication", followed by « crop insurance"
4. Implementation of reformed F&V CMO: ***single payment scheme***	Spreading scepticism about SPS effects on farm structures and product quality.	Most POs are in favour of maintaining the system but some are sceptical about their effects on farm structures.	POs interviewed say they deal entirely with products for fresh consumption

	Italy	Spain	France
5. Towards 2020. ***Role of POs: limitations and plausible improvements***	Strengthening support to POs and APOs. Reducing administrative burdens and simplifying operative commitments.	Administrative burden for crisis management measures should be simplified.	Administrative burden for crisis management measures should be simplified.
6. Towards 2020. ***Policy mix for F&V CMO: suggested changes in relative weights of tools (single payment, operational funds and programmes, crisis prevention and management scheme, etc.).***	Operational programmes are considered as a key instrument. Crisis prevention and management should be kept. No priority is given to the single payment scheme, though the general opinion is not against it.	Operational programmes are considered as a key instrument. Crisis prevention and management should be kept. No priority is given to the single payment scheme, though the general opinion is not against it.	Operational programmes are considered as a key instrument. Crisis prevention and management should be kept. No priority is given to the single payment scheme, though the general opinion is not against it.
7. Towards 2020. ***Suggested changes in crisis prevention and management schemes***	Simplification of crisis management procedures and introduction of further and more powerful instruments to create an effective safety net.	Simplification of crisis management procedures. Introduction of revenue and income stabilization tools.	Simplification of crisis management procedures.

4. Strategic issues for the F&V CMO in the post-2013 scenario

4.1. Development and role of Producer Organizations

EU experience in the F&V sector has demonstrated the key role played by POs in rebalancing bargaining power and stabilising prices and income through concentration and planning of F&V supply. Thanks to the last two reforms of the CMO[5], the EU F&V sector underwent an extended process of growth and reorganization of the production system. Nonetheless, empirical evidence shows uneven dynamics and characteristics in the strengthening of F&V POs between different Member States. POs' development dynamics differ not only among Member States, but also among products.

Several factors, both internal to the CMO scheme (as distinct from MS decisions) and external (structural factors, historical and cultural factors) can explain the strong heterogeneity of rates of participation in Organisations among MS, especially between Northern and Southern countries, as well as between new and old MS. At the EU level the average rate of participation in producer organisations in F&V is about 34% (EU-25), very far from the objective of 60% established by the CMO, but with wide differences between MS and between productive areas within a single MS.

[5] In response to the stronger position of the food retail sector in the market, the EU already, with the 1996 CMO reform for F&V, introduced by Regulation (EC) No. 2200, entrusted a key role to POs in rebalancing bargaining power and stabilising prices and income, through F&V supply concentration and planning. POs may set up operational programs, jointly financed by the Community (50%) and their members with a cap of 4.1% of the value of marketed production (VMP of the PO).
The 2007 reform of CMO for F&V (Regulation (EC) No. 1182) strengthened POs' role by introducing some elements with the purpose of favouring greater competitiveness and market orientation in the sector, as well as its better sustainability. In particular, it provided for a wide range of tools for crisis prevention and management to be carried out through POs, as well as more incentives for mergers of POs and associations of them, and for those regions with a particularly low level of participation rate, etc.

Notwithstanding several difficulties in the developmenmt of POs, the EU experience confirms the validity of the association model, as maintained by Copa-Cogeca (2010), in whose opinion "the intervention of F&V POs on the market does not only benefit their associated producers, but all producers in the sector".

As a matter of fact, the organizational model emerging from the current state of agro-food markets, as well as the required competitive strategies, imply more stringent forms of chain integration where the retail stage coordinates the other actors. This makes the high contractual strength of large-scale retail an issue because of the persistent fragmentation of agricultural production, and imposes forms of producer associations as tools for rebalancing shares of value added along the F&V chains.

Producer organizations can therefore constitute a fundamental counterweight, restoring balance to market relationships, acting as a contractual tool for redistributing added value and contributing to reshaping forms of economic dominion into models of cooperative behaviour.

For this reason the EU Commission has always recognized the strategic role played by POs, focussing on the organization and concentration of agricultural supply. This is particularly true for the F&V CMO, where the concentration of production is defined as an "economic necessity" to consolidate the farmers' position on the market and help them face future challenges which the CAP itself has counted on. On the other hand, the last CMO reform for fruit and vegetables has, compared to previous legislation, provided essential elements to reinforce regulation of supply by an organized component, effectively giving strategic functions to the POs to improve competitive capacity in the sector.

In this view and considering the prevailing opinion among the F&V operators, claiming that "the objectives of the aid scheme for the fruit and vegetable sector will remain valid in the post-2013 CAP" (Copa-Cogeca, 2010), the EU Commission has proposed to maintain in the new Single CMO regulation the existing support framework based upon POs and their relevant tool, operational programs[6] (EU Commission, 2011). If on the one hand this proposal goes in the direction hoped for by the F&V operators, on the other hand, at the moment it does not agree with their requests for introducing adjustments in working rules that both logic and experience would suggest[7]. A new element introduced in the draft of the Single CMO for the F&V sector is that the Commission shall be empowered to adopt delegated acts establishing rules on the management of POs' tools, in order to "ensure an efficient, targeted and sustainable support" to POs. In particular, referring to the Union's financial assistance, the Commission shall establish the value of the marketed production of a PO, as the basis for the calculation of EU aid. Unlike the current situation, in which the recognition of POs is left to the choice of Member States, the proposal obliges Member States to recognize them as long as they comply with the Commission's criteria.

On the other hand, the issue of strengthening the bargaining power of farmers in the food chain, through the formation of POs and their associations, is one of the new ones addressed

[6] However, it seems that the Commission tends to wait for a report on the impact of the 2008 F&V reform, due to be published by the first half of 2013. This, in order to have an assessment of the effectiveness of existing market measures, before establishing new ones. In any case, there seems to be room for a strengthening of POs and their associations, and, in particular, the role of interbranch organizations.

[7] With reference to the main requests coming from several institutional and economic subjects involved in the debate on the future of the F&V sector and its CMO, the attention has been focused on the following issues: (*i*) increasing the level of Community aid in order to encourage mergers of POs and setting up of APOs on a transnational level; (*ii*) developing competition rules better addressed to the organizational framework; (*iii*) improving/reviewing crisis prevention and management measures within POs' operational programs; (*iv*) providing at a horizontal level additional and complementary tools aimed at managing more severe crises ; (*v*) creating a European observatory to improve market transparency ; (*vi*) making more effective the operation of the « entry price » mechanism.

in the Commission's proposal. In the new Single CMO the Commission suggested extending the product coverage for recognition by Member States of POs and their associations, as well as interbranch organizations, to all sectors covered by the regulation. However, the rules on these subjects seem rather generic: neither is there a clear definition of a PO, nor are incentive and support schemed suggested, except fot specific cases. Instead, a great concern on their compatibility with EU competition rules seems to prevail.

4.2. Market risk and crisis management

These new measures were integrated into the operational programs by Reg. 1234/2007 (single CMO) with the objective of increasing attractiveness of POs to producers. In the case where a PO decides to implement them, Community aid may rise to 4.6 percent provided that the excess (0.5 percent) is used only for crisis prevention and management.

In principle, joining a PO may itself be deemed as an effective tool of crisis prevention that F&V producers may adopt. Effectiveness, however, requires the fulfillment of preliminary conditions on the organisation of the PO, in which both market sales and the planning of production activities at the farm level should be centrally managed. Therefore larger POs, with a better structured internal organisation and a stronger orientation of sales towards large retailing are potentially more successful in preventing market risks and crisis. As a consequence, easing conditions for the recognition of POs by requiring lower values of marketable production – a change introduced in the 2007 CMO – does not match the need to improve risk management capability in the EU F&V industry. Although the effort to increase the share of organized production, particularly in areas where it is not adequate, is of paramount importance to the development of the F&V sector, it is also necessary to shape incentives to POs in such a way as to make them effective.

Among the tools currently available in the 2007 CMO for risk and crisis management (market withdrawals; green harvesting or non-harvesting of fruit and vegetables; promotion and communication; training measures; harvest insurance; support for the administrative costs of setting up mutual funds) only some have been implemented by National Strategies and subsequently used by POs[8]. Green harvesting or non-harvesting, training measures and support to mutual funds have not been implemented, apparently because of uncertainties about their contents and accessibility, but also because they are deemed to be ineffective.

Based upon results of the survey, promotion and communication are probably the most widely adopted measures of risk and crisis management. However, clearer definition of its contents is necessary, as well as of the implementation of its modalities in the context of market crisis, and the relationship of this instrument with other similar measures that can be implemented within the operational program in a standard way.

Market withdrawals and harvest insurance have been used only to a very limited extent (Spain has not even introduced harvest insurance in its National Strategy). The scarce interest for market withdrawals seems related to the low compensation, while support to insurance seems unsuitable within the CMO because of the limited availability of resources within the operational funds of POs, as well as the possibility of financing it with other CAP measures (art. 68 from the Health Check).

Such a displacement might become even stronger in the wake of the new risk management

[8] The National Strategy should define priorities, objectives and instruments of operational programs, as well as introduce indicators for their assessment. Moreover, each Member State should establish a National Strategy for sustainable operational programs in the F&V market, integrating a national framework drawing up the general conditions for environmental measures.

package envisaged in the draft new regulation on rural development (EU Commission, 2011). At a first glance, the new provisions replacing art. 68 would provide even wider and deeper options for risk management overlapping with the current F&V CMO, at least when harvest insurance and mutual funds are concerned[9]. This also based upon the awareness that no significant changes to the structure and funding for risk management measures are to be found in the draft regulation for the new single CMO (EU Commission, 2011). This last consideration also suggests that, by moving the bulk of risk management support from the first Pillar (art. 68) to the second Pillar of the CAP, the coordination between operational funds and financing RDP measures should be reconsidered.

Under the assumption – currently necessary, based on the new draft regulations – that provisions on risk management will be kept on both tracks, some further considerations may apply. Firstly, referring to the current F&V CMO, certainly the financial rigidity of the endowment for market crisis measures in the operational fund is a critical issue. The endowment being constant over time (as for the other measures) does not well suit the nature of its target: market crises and related income effects on producers are obviously uneven in different periods. Introducing arrangements allowing a wider intertemporal flexibility of the financial limits to the implementation of such measures, according to the real needs of intervention, and providing additional constraints aimed at avoiding a recurrent use of this type of measures, could be beneficial.

Moreover, considering that measures for the implementation of mutual funds did not receive very much attention by POs, the role of saving/credit in transferring risk over time would probably be shaped by the mutual funds envisaged in the new regulation on rural development, since in that framework support would not be restricted to administrative costs of setting up the mutual fund. Finally, both the preliminary evidence of the implementation of the 2007 CMO reform, previously discussed, and the new options proposed by the on-going CAP reform process might suggest narrowing the support to insurance only to covering PO risks related to the reduction of product marketed by their members.

Along with the existing and predictable risk and crisis management tools – and probably also in connection with some of the solutions under scrutiny proposed in the new risk package to be placed under the II Pillar of the CAP - the introduction of market intelligence can be considered as a further instrument for risk management and crisis intervention. The monitoring of F&V markets through the collection, elaboration and analysis of relevant data on prices, consumer preferences and behaviours, product supply and meteorological trends and spreading the information among POs may help in anticipating possible temporary or structural crisis that could be better managed and prevented with timely intervention.

The implementation of this type of activity is not easy and would require a certain degree of centralization in agencies capable of serving associations of POs or the totality of POs in a country. Moreover, this could be a very difficult exercise because of the complex process of price formation along the F&V chain, which depends on several factors embodied in the relational frameworks and structural inefficiencies existing inside the chain.

[9] The toolkit proposed in the draft regulation on rural development (art. 37) is made up of three items:
- a financial contribution, paid directly to farmers, towards premiums for crop, animal and plant insurance against economic losses caused by adverse climatic events and animal or plant diseases or pest infestation;
- a financial contribution towards mutual funds to pay financial compensations to farmers, for economic losses caused by the outbreak of an animal or plant disease or an environmental incident;
- an income stabilization tool, in the form of financial contributions to mutual funds, providing compensation to farmers who experience a severe drop in their income.

4.3. Contractual arrangements

Contractual relationships have gradually become established over the last decades as a result of the process of concentration that has accompanied the substantial growth of large-scale retail, causing a strengthening of contractual power *vis a vis* upstream suppliers, especially when they are operating in sectors, such as F&V, where many areas and products are characterized by a low level of concentration. This development has led to an imbalance in power relations within the agro-food market, bringing about significant change in the relations that large-scale retail has with agricultural producers, as well as in the process of formation of added value along the agro-food supply chain, at the expense of the agricultural sector.

This situation poses two questions which are closely interrelated, and which take on particular relevance in the F&V supply chain: the first concerns the increased buying power of large-scale retail; the second concerns the contractual relationships that large-scale retail maintains with upstream subjects in the chain, namely agricultural producers and the food industry. On the other hand, "an increase in buying power of large-scale retail also necessarily translates into strong negotiating power in contractual clauses with suppliers" (Marette, Raynaud, 2003) as well as an increased share in overall profits within the vertical structure that large-scale retail can require (Allain, Chambolle, 2003).

However, agricultural contracts can lead to improvements in efficiency of supply chain organization, through a reduction in transaction cost, above all as a result of the remarkable transformation process that has involved agro-food chains. These changes, consisting in consolidation (increasing concentration in processing and retailing), new patterns of consumption (food quality and safety concerns), and technological changes, have also stimulated changes in organisational schemes towards greater degrees of vertical control by the downstream subjects (Vavra, 2009). The result of this process is an increased use in recent years of contracts in agriculture, characterized by a wide variety of arrangements that can differ strongly both among agricultural sectors and among single products within the same sector.

The contracting issues in agriculture raise a question about a possible role played by policy intervention in regulating this arrangement, for which a suggestion could be that of fixing common rules and a shared vocabulary for contracts which would allow the transaction costs of negotiating to be reducedd (Schwartz, 2002; Wu, 2006; Vavra, 2009). Related, very sensitive issues, regard unequal market power and fairness of contracts. In order to prevent abuses of market power towards weaker subjects, as generally farmers are, and also rent seeking, public authorities could have an important role in overseeing the contractual relationships between upstream and downstream actors, ensuring that "the margin-sharing throughout the sector takes place under the most transparent and, where possible, most balanced conditions" (Chatellier, 2009).

Considering that "action is needed to eliminate unfair contractual practices between business actors all along the food supply chain" the EU Commission (2009a) suggested a number of policy initiatives aimed at overcoming problems tied to contractual imbalance associated with unequal bargaining power and promoting sustainable and market-based relationships between actors along food supply chain.

In this view it is suitable take recourse to organisational solutions which would enable the reconstitution of better balanced exchange relationships. As a matter of fact, producer associations are a strategic lever that can "restore symmetry to the organization of the transaction between a multiplicity of scattered producers and a highly concentrated distribution sector" (Ménard, 2003).

The recent proposal on contractual relations in the milk and milk products sector, presented by the EU Commission in December 2010 (COM (2010) 728), within the so-called "Milk

Package" seems to move in this direction. In December 2011, on the Commission's proposal, the EU Parliament and Council agreed on a compromise text, which provides for optional written contracts between farmers and dairy processors, to be drawn up in advance of delivery of the raw milk[10].

Another interesting experience concerns a recent decision taken by the French Government about making contractualisation between producers and their buyers in the milk and F&V sectors compulsory[11].

Taking into account the above-mentioned experiences, for the F&V sector the possibility could be envisaged of developing, within a general framework outlined at EU level, a contractual model that provides for the settlement of minimum standard conditions, with a proper degree of flexibility accounting for specificities characterizing each F&V product and region. This could be entrusted to an interbranch organization which should draw up agreements on contractualisation stating guidelines and promoting best practices and market transparency in order to avoid unfair commercial practices.

In the draft regulation on the Single CMO (EU Commission, 2011) there is no article devoted to contractual issues, except, obviously, for the milk sector for which the measures set out in this regulation reflect the proposal already made in 2010. Only for this sector the Commission lays down some basic conditions for the use of written contracts, while in other cases it makes a mention of the contractual issue, specifically in a preamble of the draft where the Commission asserts that "*in the absence of Union legislation on formalised, written contracts, Member States may, within their own contract law systems, make the use of such contracts compulsory*". This is on the condition that the Union law is respected, in particular as regards the good functioning of the internal market. The Commission justifies its resolution in consideration of the fact that, taking into account the wide variety of situations across the Union, "*in the interests of subsidiarity*", Member States should take such a decision. With such decisions Member States can play an important role for the development of relationships in the agro-food sector, because the degree to which they make the contracts compulsory may have relevant consequences for their dynamics.

As far as the interbranch organisation is concerned, there is no European legal body that delineates its range of action, even if the Single CMO recognizes its legitimacy by Member States on the basis of their national laws. In particular, the new regulation devotes an article (Art. 108) to this tool: as to existing rules, it extends to all sectors the general principles regulating its recognition that Member States should grant and specifies in detail the several objectives which should be pursued by the interbranch organization.

The interbranch device (organization and agreements)[12] can lay down the necessary conditions for the market to function more efficiently (Bovet, Chappuis, 2001), with greater transparency and in accordance with a fairer division of risks and profitability from the production

[10] The main features of this proposal are:
- key aspects such as price, timing and volume of deliveries, and duration of the contract are included;
- in order to rebalance bargaining power of milk producers, farmers can negotiate contract terms, including the price, collectively, via producer organizations;
- Member States can make these contracts compulsory;
- cooperatives are not required to subscribe to contracts on the condition that their statutes provide for rules addressing the same objectives.

[11] On the basis of the French law « *Loi de modernisation de l'agriculture et de la pêche* », two decrees had been issued at the end of 2010 regulating the signing of written contracts for the selling of produce in these two sectors.

[12] For an in-depth analysis on the role and definition of the interbranch organization see: Coronel and Liagre (2006); Giacomini, Arfini and de Roest (2010). In this regard, it is worth mentioning the interesting French experience of interbranch organisation and agreements, recognised as the most consolidated one at international level.

processes set up. It can strengthen coordination and collaboration between various stages of the supply chain, in order to counter and reduce opportunistic and encourage cooperative behaviour, as well as restore balance in power relations on the market.

At the same time, the interbranch device can play a fundamental part in helping individual producer associations to acquire a truly active role on the market and reach an effective level of concentration and control of supply, using the *erga omnes* tool (Petriccione, 2008). However, the issue of the *extension of rules* raises the problem of political choice, given that it has to be applied in accordance with certain conditions and with the guarantee of its compatibility with Community competition rules.

4.4. The issue of competition rules

Encouraging sizeable POs, able to cope with large-scale retail and current market requirements, raises the issue of POs' consistency with competition rules. The agricultural sector is subject to the EU's competition rules under a special regime[13]. The need for a special treatment of agricultural products derives from the major complexity of the relations between actors along the supply chain, which fuels a wide debate at political and scientific level on the controversial relationship between competition rules and agricultural policy, with particular reference to the issues of the increasing bargaining power of large retailers and their contractual relations with the upstream actors (EU Commission, 2010a; VV.AA., 2003; Desai *et al.*, 2010).

Within the public debate on competition policy two issues seem to be particularly relevant: the increase in bargaining power of large retailers and their contractual relations with the upstream actors. There is no doubt that the retailers who detain a major bargaining power also hold a strong power to negotiate the contractual clauses with the upstream subjects. These relations raise the question of legitimacy of certain contractual practices and of regulation that could set a limit to certain abuses of the retailers towards a fragmented agricultural supply. In this context, the issue of the role of POs and other forms of farmers' associations to increase the bargaining power of farmers is one of the key points analysing the interface between agricultural and competition rules (Cesarini, 2009; EU Commission, 2010a; VV.AA., 2003).

Although competition law imposes restrictions to farmers' agreements, there is however the opportunity for POs to operate as cooperative organizations, recognized by European Courts as pro-competitive structures, which may collectively negotiate. EU competition rules view such agreements favourably if the farmers involved in these forms of cooperation do not collectively hold a level of market power such as to restrict competition in the market to the detriment of consumers. In this regard, the "Milk Package" has proposed a quantitative limit (market share)[14] which would allow POs to negotiate ensuring at the same time market competition. The market share is evaluated on the "relevant market" although positions in the debate on the ways to define the relevant market are still controversial.

Current competition rules may still be considered unfavourable towards agricultural producers affected by weak bargaining power *vis a vis* a sole large retailer. Public and scientific debates

[13] This particular regime envisages three exemptions referred to as:
a) agreements which are an integral part of internal market organisations;
b) agreements necessary for the attainment of the objectives of the CAP (Article 39 TFEU);
c) agreements between farmers, farmers' associations and associations of farmers' associations concerning the production or sale of agricultural products or the use of joint facilities for the storage, treatment or processing of agricultural products.

[14] The proposal, confirmed by the draft regulation on Single CMO (EU Commission, 2011), regards the following thresholds: 3,5% of EU milk production and 33% of national milk production of the Member States involved.

show a certain consensus on that, particularly based on the comparison between the Single CMO regulation, which states concerns about the abuse of both "dominant positions" and common rules, and the legislation in other States (e.g., Switzerland) where the only concern is on avoiding dominant positions.

5. Conclusions

The current difficult situation of the EU F&V producers arises mainly from long-term changes in the structure of the global F&V supply chain: consumers are increasingly demanding services, including convenience in food purchasing and preparation, taste, and variety, and are increasingly concerned for food safety and quality; sales are increasingly being controlled by fewer and fewer retailers, with a growing bargaining power; the role of the WTO and bilateral negotiations is becoming more important in widening competition; multinational agribusiness is now more important due to upgrading of logistics, communication, information technology, and transport, enabling fresh products to be transported from many origins.

These changes will continue to shape the future of the F&V economy in the EU and will deepen as the sector becomes more globalized and interconnected. Collective action at producer level and effective coordination within the chain appear to be pre-conditions for any successful strategy in coping with declining relative producer prices and the gap between farm and retail prices. Moreover, forms of producer organization should continue to be encouraged as an effective way to increase collaboration between growers and other members of the supply chain and develop partnerships around shared interests in cost reduction, quality upgrading and risk management.

EU experience has shown the key role played by POs in rebalancing the bargaining power and stabilising prices and income, through the concentration and the planning of supply. The EU Commission itself considers POs "an economic necessity in order to strengthen the position of producers in the market".

Notwithstanding several difficulties in the development path of POs, the organisational model emerging from the current set-up of agro-food markets, as well as the required competitive strategies, implies more stringent forms of both horizontal and chain integration where the retail stage coordinates the other actors. Producer Organizations can constitute a fundamental counterweight, restoring balance to market relationships, acting as a contractual tool for redistributing added value and contributing to cooperative behaviour along the chain.

The Commission's proposals for the post-2013 CAP reform confirms the current policy framework based upon POs and their relevant tool, as operational programs. However, even if the draft regulation is not in line with the F&V operators' requests for introducing suitable adjustments in working rules, there seems to be room for a strengthening of POs and their associations, and, in particular, the role of interbranch organizations. Great concern seems to prevail, instead, about the development of more advanced institutional solutions in the matter of relationships between competition law and POs.

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SUPPLY CHAIN RELATIONSHIPS AND QUALITY CERTIFICATION SCHEMES: A CASE STUDY IN FISHERIES

JEL classification: L15, Q13, Q22

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Abstract. *The Italian fishery supply chain is highly fragmented and lacking in organization; consequently most firms experience high operating costs, low sale prices and limited profitability.*

The purpose of this paper is to contribute to the assessment of the effectiveness of policy intervention, in particular the creation of a collective label of origin, to promote local fishery products and increase their value. As a case study, we focus on the quality certification scheme named "PCAA - Prodotto Certificato dell'Alto Adriatico" (Certified Northern Adriatic Product), proposed by the Emilia-Romagna Regional Authority in order to promote the economic development of the regional supply chain and to facilitate private initiatives for coordination among supply chain participants.

By means of a direct survey on key regional economic agents, we investigate organisation of firms, relationships between them and their strategic behaviour at each stage of the supply chain - namely fishing and aquaculture firms, wholesale markets, wholesalers, processors and retailers.

As a result of the analysis, we provide an assessment of product flows along the supply chain for the main commercial species in Emilia-Romagna. We identify factors affecting the decision to participate in the PCAA certification scheme, and we discuss the expected effects of private agents' strategies on supply chain organization, as well as possible public intervention policies.

Key words: *supply chain coordination; collective strategy, free riding; quality certification schemes; fishery sector.*

1. Introduction

The dynamics of marketing and distribution of food products, and in particular fish products, indicate radical changes in recent years. The main trends include, on the one hand, the progressive development of modern distribution chains and, on the other, the growth in imports of large volumes of standardised products.

In Italy, approximately 60% of fresh products are sold by modern distribution channels and about 75% of the fish that comes on the tables of consumers is imported. At the same time, the general downward trend in food consumption, also affects fishery products, thus intensifying competitive pressure in the sector. A major drawback for Italian fisheries, moreover, is the very

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small size of firms that limits their ability to build relationships with other key economic agents in the supply chain, such as the processing industry and distribution chains.

Product differentiation and quality certification strategies may provide an effective solution for alleviating competitive pressure on firms and improve their profitability by boosting the consumption of domestic produce and increasing consumer satisfaction.

European Institutions have approved measures favourable to this line of action. The first time, more than ten years ago, in the Council Regulation 104/2000 on the Common Market Organisation in fishery and aquaculture products, supply concentration through producer organisations, was encouraged and interbranch organisations recognized, with the purpose of "*developing methods and instruments to improve product quality, exploiting the potential of, and protecting, designations of origin, quality seals and geographical designations; exploiting more fully the potential of fishery products and promoting fishery products*". More recently, in the final proposal for the Common Fishery Policy reform, the European Commission stresses its commitment to remedy the imperfections in the market, responding to the problem of high costs of information and transactions, as well as to solving organizational issues in order to improve the marketing of first-time sales and increase the competitiveness of EU production through the processes of integration and differentiation.

Quality signs, and among these, quality labels, provide a particularly interesting differentiation tool, as they emphasize the connection of a product to a specific territory or to specified quality characteristics. Moreover, quality marks are designed to ease market information transmission, so as to facilitate the recognition of quality attributes by consumers, and therefore, to increase their appreciation of the product.

In the light of this approach, the Emilia Romagna Regional Authority, in planning the use of EU Structural Funds, designed a path for the exploitation of regional fishery products, by means of a collective brand of certified quality, named "Prodotto Certificato dell'Alto Adriatico – PCAA" (Certified Northern Adriatic Product). The PCAA is intended to favour product differentiation based on its origin and specific production requirements, as well as to promote vertical coordination and to increase the profitability of the entire regional fishery supply chain.

The collective brand establishes a certification system for all the products fished, bred, gathered and packaged in the Northern Adriatic, conceived as a production system using resources and natural regulatory mechanisms to ensure that all its activities are sustainable. The brand name[1] is owned by the Emilia Romagna Regional Authority, while the beneficiaries are all economic agents, fishing and aquaculture firms, wholesale markets, processing industries and intermediaries, fishmongers and restaurants. Membership is voluntary and requires compliance with the production rules specified by the Regional Authority. Third-party certification and control procedures, as well as penalties designed to sanction opportunistic behaviours are enforced, to ensure the reliability and effectiveness of the certification scheme for both consumers and supply chain agents.

Given these premises, the objectives of this paper are to analyze the factors that incentivate economic agents to participate in voluntary quality certification schemes and to investigate the possible effects on the supply chain organization, considering the PCAA initiative as a case study. The study will also discuss the possible measures that could be implemented by the public

[1] Introduced by Regional Law n.1418, 15th September 2008.

authority in order to allow all the stakeholders involved to benefit from the participation in the certified supply chain.

2. Theoretical background

2.1. Supply chain relationships and product certification schemes

Various authors (Boon, 1999; Mighell and Jones, 1963) refer to the food system as a series of vertically inter-related stages and describe vertical coordination as "all the ways in which these stages are directed and fitted together". Linkages between stages in the food system require both quantitative and qualitative coordination: *quantitative* coordination is the balancing of quantities of inputs and outputs; *qualitative* coordination consists in the specification and development of certain processes and products and has become more and more important.

The coordination required may be provided not only by pure market transactions (led by price signals), or by full vertical integration (under managerial direction), but also by other intermediate forms of vertical coordination, relying on price signals as well as ex-ante non-price agreements. Recently, growing awareness of the importance of product quality amongst agribusiness managers and the increasing dissatisfaction with product quality amongst consumers may be interpreted as examples of failure of the existing market system (Boehljie et al., 1995); vertical coordination is often mentioned as a solution for such market failures (Johnston and Lawrence, 1988).

Additional motives for vertical coordination arise from specific market and production characteristics. Perishable produce is strongly affected by the direct relation between the intrinsic attributes of the final product and those of the primary product. Vertical coordination is also likely to occur to solve issues related to quality and quantity variability (e.g. due to biological variation, seasonality, weather conditions, etc.), stabilisation of consumption and increased consumer attention concerning both product attributes and characteristics of production methods.

Product certification schemes provide a useful tool to ensure a certain quality standard, to communicate effectively product differentiation to consumers, and to create higher value for all economic agents participating in the supply chain. Collective brands are certification schemes that can be requested by a group of actors, designed to guarantee the nature, quality or origin of certain goods or services. Product quality is attained either by compliance with a predefined production method, or to a common local heritage in the area considered, due to natural or cultural conditions. Both elements, i.e. production method and product origin, contribute to the creation of a collective reputation and strengthen consumer appreciation and confidence. In this way firms are able to create a new market segment, where consumers are willing to pay a premium price for the branded product (Shapiro, 1982, 1983). Other benefits induced by participation in a collective brand concern the relationships with the other actors along the supply chain, particularly in terms of certainty and standardisation of procurements, more transparent information, a limited number of intermediaries and ease of access to final consumers.

According to Fisher et al. (2008), in order to maintain high quality standards, formal relationships (written bilateral contracts and financial participation agreements) are usually preferred to informal ones (spot markets or repeated market transactions with the same buyer/supplier). On the contrary, non-formal relationships are preferred by firms that strive for independence.

Actually, collective brands are effective as long as product quality and characteristics of produc-

tion methods are pre-emptively and explicitly defined by the collective organisation (Pilati, Flaim, 1994) and single firms cannot lower product quality below the level imposed by the collective brand. This implies that each actor along the supply chain has to comply with specific organisational and production requirements that limit their flexibility, for both qualitative and quantitative strategies. Therefore they are not free to take arbitrary decisions concerning the selection of procurement, the choice of suppliers, the type and distance of final markets, etc.

A major threat for the success of a collective brand is due to the opportunistic conduct of single actors, who attempt to take advantage from information asymmetries on the demand side. In fact, in case of combined production by many agents, without adequate incentives and monitoring systems, *free riding behaviour* will arise (Holmström, 1982). As pointed out by Klein and Leffler (1981), in the short run the quality reduction induced by free riders will lower production costs, but in the long run it will negatively affect the collective reputation. Hence, individual opportunistic strategies may imply negative effects on the whole supply chain as well as on consumers, hampering the effectiveness of quality signals and increasing price and income instability. Since adequate profitability is necessary for undertaking investments for quality in the long run, the collective brand supply chain may no longer be sustainable.

In conclusion, the strategic choice of participating in the collective brand implies a trade off between short-run and long-run payoffs and individual decisions influence the structure and organisation of the whole supply chain.

2.2. Quality differentiation strategies in the agri-food sector

"Quality" may be interpreted as the extent to which (agri-food) products meet consumer expectations. The agri-food product being described as a basket of characteristics or attributes, consumer preferences refer to a set of attributes rather than to the "product" itself as a whole; some of these attributes are not observable by consumers before (or even after) purchase/consumption, so that "quality" is not verifiable (Darby and Karni, 1973; Nelson, 1970)[2]. In addition, consumers are "imperfect problem solvers", who collect limited information upon which to base their choices (Henson and Traill, 1993). Further, the set of information available to consumers is itself imperfect[3]. Finally, food manufacturers and retailers are better informed about the nature of the products they sell than individual consumers. In this context, the main approach taken by consumers to reduce the risk associated with purchase/consumption consists in the use of "risk relievers"; consumers thus rely upon "external risk indicators" (McCarthy and Henson, 2005), i.e. "extrinsic quality cues" (e.g. brands, geographical indications, label information, the nature of food packaging, the nature of the food store, etc.) and are willing to pay for a "quality sign" that increases the probability of product success in meeting their expectations (Loureiro and Umberger, 2007; Grunert, 2005)[4].

These information asymmetries have crucial effects on the behaviour of economic agents. Whilst discovering the actual level of quality is costly for consumers (and, in some cases prohibi-

[2] Some attributes, the so-called "experience" attributes, are only verifiable after purchase (e.g. taste or organoleptic characteristics), whilst others are not observable, even after purchase/consumption (the so-called "credence" attributes, such as safety, or the effects of the production process on animal welfare, environment or ethical issues, or product origin).

[3] As regards food safety, for example, all food-borne risks factors fall either into the experience categories (e.g. acute food risk factors, *salmonellosis* and other food poisoning) or into credence ones (e.g. chronic food risk factors, such as nutritional imbalance in the diet, food additives or pesticide residues).

[4] It is worth noting that the higher the *perceived* risk the more frequent is the use of risk relievers and the willingness to pay for a risk reduction (Angulo and Gil, 2007; Brown et al., 2005).

tively so), producing a "quality good" is costly for firms. Such a market has specific economic properties: anticipating the risk that quality efforts may be inadequately perceived (and thus remunerated) by the market, firms may under-invest in quality in the long term. Hence, an adequate "premium price" is a necessary condition for maintaining quality in the long term, when this latter is not directly observable (Shapiro, 1982, 1983; Klein and Leffler, 1981). In the absence of adequate quality signals and control systems, the risk is that of a reduction of the average quality supplied to the market (Akerlof, 1970) and, more in general, of an under-provision of quality (or safety) with respect to the socially optimal quality level.

The necessity of assuring the provision of the socially optimal quality level justifies public regulation of quality. The public authority may intervene, for example, by imposing minimum quality standards (MQS) or ex-post liability rules (e.g. in the domain of food safety) or by designing voluntary certification schemes. Indeed, as underlined by Henson and Humphrey (2009) public standards may be mandatory or voluntary. Notably, voluntary certification schemes make it possible to reduce information asymmetries by communicating to consumers the compliance with specific quality (process or performance) standards, through a logo or a brand, while giving firms access to a quality-based competitive advantage relying on the collective reputation and to the related "premium price" (to the extent to which consumers "react" to the quality improvement). In this context, the design of adequate certification procedures and control systems aims at guaranteeing the transparency of product requirements and the reliability of firms' claims about the quality/safety of goods, at avoiding opportunistic behaviours arising when collective initiatives are concerned (notably, the free riding phenomenon) thus "protecting" firms' quality investments and ensuring the maintenance of quality level in the long term.

In this context, the PCAA brand can be classified into the category of collective voluntary "certification schemes" (European Commission, 2010). It can, in particular, be classified as a "differentiation scheme", following the definition given by EU Commission "differentiation schemes aim to distinguish certified products from others by highlighting certain product or process attributes (e.g., observance of strict animal welfare or environmental requirements; organic farming; social standards; high organoleptic product quality; origin; etc.) and communicating this fact to the consumer by means of a logo or label. Farmers and producers can use such schemes to improve their marketing position and obtain higher prices for their products.

Quality differentiation is here mainly based on product origin and on specific quality standards, in some cases more restrictive than public regulations. Looking in more detail at the features of this initiative, participation in the certification scheme requires economic agents to comply with specific production requirements (or quality standards) that regulate both production and commercialization practices and characteristics of the final product (e.g. product size, packaging, etc.).

The voluntary nature of this initiative carries at least three main implications. First, firms' strategic incentive to adhere to such a voluntary scheme results from both costs (e.g. costs of compliance with the standard, certification and control procedures, additional production costs, etc.) and benefits (e.g. quality-based competitive advantage, reputation, reduction of market risk in the long term, etc.). The decisional process of firms regarding participation takes into account the expected costs and benefits associated with the initiative (see for example Loader and Hobbs, 1999, for a conceptual model of the strategic process of compliance to food safety legislation). Second, given the voluntary nature of the initiative, the resulting market structure is endogenously determined by the number and the nature of economic agents adhering at each stage in the supply chain (see for example Giraud-Héraud et al. 2012 for an analysis of Joint Private

Standards in agri-food chains). Third, the long term "sustainability" of the initiative depends on the mechanisms designed to ensure participants' compliance with the standard, thus protecting quality investment (and the collective reputation of the brand) in the long term.

3. Methods and data

Research into vertically co-ordinated supply chains poses particular challenges for researchers, especially when assessing the relationships among different stages (Hornibork and Fearne, 2006). In this view, the case study research strategy is identified as being the most appropriate when examining 'how' or 'why' research questions (Yin, 1989; Eisenhardt, 1989). Moreover we recall that the Italian fishery supply chain includes a set of heterogeneous and fragmented firms, that cannot be adequately assessed using only conventional sector statistics.

Therefore, after collecting all the relevant secondary data from official national statistical bodies (Irepa, Ismea, Istat), we carried out an empirical investigation in the Emilia-Romagna fishery supply chain.

The survey was conducted by means of a questionnaire on a non-probabilistic, non-random sample. Twenty key actors, along the supply chain were interviewed, both participating and not participating in the PCAA initiative, including four main categories: *i)* fishing and aquaculture firms, *ii)* wholesale markets, *iii)* wholesalers and processors *iv)* retailers (fishmongers and restaurants).

The questionnaire was divided in two parts. The first part was specific for each of the supply chain stages addressed and it was intended to quantify the product flows of the main species, with questions concerning the size and structure of the firm, the quantity and type of produce and the relationships with suppliers and purchasers, in terms of volumes marketed and distribution agreements contracts. The information gathered in this way was elaborated for each species of interest[5] and complemented with secondary production and import-export data previously collected to estimate the corresponding supply balance and product flows at each stage of the supply chain (see *Figure 1*).

The second part of the questionnaire aimed specifically at investigating firms' attitudes towards product differentiation, their perception of the PCAA collective brand and its possible implications on the regional supply chain. In particular, the second part of the questionnaire was divided in three sub-sections: the first was intended to register the opinion of the agents on current market conditions and on the relevance of product attributes and to discover their strategies concerning quality and brands; the second focussed on the benefits and the compliance efforts anticipated by the agents for participating in the PCAA initiative, on the basis of the specific requirements of the production method imposed by the Regional Authority; the third was designed to collect interviewees' opinions on the development of relationships among stakeholders and the need for further public intervention policies to support the certified supply chain.

[5] The main species considered are small pelagics (anchovies, sardines, mackerel and sprats), bivalves (mussels and clams), crustaceans and cephalopods (mainly mantis shrimps - *Squilla mantis*, caramote prawns - *Penaeus kerathurus*, other squids and small cuttlefish).

4. Results

In this section, we illustrate the results of the empirical analysis. First, we provide an illustration of the supply chain organization based on official data on fisheries and wholesale markets. We then illustrate the results of the direct survey aimed at assessing the expected benefits and compliance efforts perceived as associated with the voluntary certification scheme and thus the factors influencing the strategic incentive of economic agents to participate in the collective initiative. Finally, we illustrate the possible effects of the voluntary certification scheme on the supply chain organization.

4.1. Fishery supply chain organization in Emilia-Romagna

The fishery supply chain in Emilia-Romagna is characterized by a high degree of heterogeneity between the economic actors, with respect to firm structure, supply chain relationships and strategic behaviour.

Aquaculture, especially production of mussels and clams, is a very important economic activity in Emilia Romagna. The production of the region plays a fundamental role in the Italian aquaculture sector as a whole: with approximately 32,000 tons of bivalves produced in 2007/08, Emilia Romagna contributes, in fact, 27% to national production and approximately 29% of the total catches in sea fisheries. On the other hand, fishery is characterized by a high degree of fragmentation, as firms are usually very small. In fact, industrial fishing is conducted by only 4% of boats, but accounts for about 30% of the total Gross Tonnage of the regional fleet. Analogously, there is a large number of harbours, but each one is too small to meet market demand in terms of species, catch and size.

Located near the main harbours, the wholesale markets play an institutional role in the marketing process of fresh and frozen fishery products, as they provide the necessary sanitary certification for the products sold and prices are determined by auctions. However, in spite of their crucial role, only a minority quota of regional catches (less than one third) are exchanged through wholesale markets; quite often, especially for small pelagics and mussels, firms choose to deal separately, directly with wholesalers and traders or processors.

Wholesalers and processors exchange the larger proportion of volumes in the supply chain, as they purchase both from wholesale markets and directly from producers, on a very wide geographical scale (either national or international). We estimate that about 50% of these firms are pure traders, 43% of them also offer preserved products (salted, smoked, dried, etc.) and only 7% are pure processors, selling food preparations.

These general considerations on the role of the various actors along the supply chain can be further detailed for the main species of interest (*Figure 1*). The analysis conducted shows that small pelagics (and particularly anchovies) are the most important species exchanged on wholesale markets, where volumes sold account for a large share of both catches (18%) and total internal availability (33%)[6]. The quantity marketed directly by producers' associations is also relevant, with more than 10% of catches and about 20% market availability. However, wholesalers are the actors who concentrate the largest share of product flows, with purchases straight from producers and from wholesale markets. As far as anchovies and sardines are concerned, wholesalers deal with more than 90% of market volumes. Other species show more balanced product

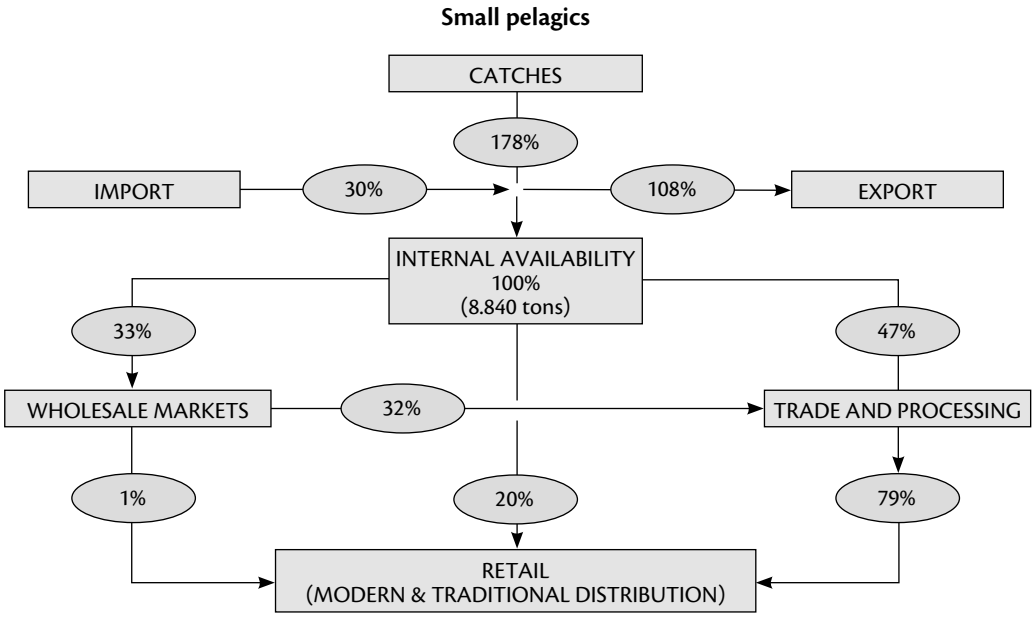
[6] Internal availability is calculated as the sum of catches and imports, minus exports.

flows: sprats are almost equally demanded by wholesalers and retailers, while mackerel is bought mostly by local traditional retailers, i.e. fishmongers and restaurants. Wholesalers purchase about 40% of small pelagics from wholesale markets, 40% directly from producers' consortia and the remaining 20% is equally divided between other wholesalers and importers. Producers' consortia are particularly important with respect to anchovies, sardines and sprats, providing about 50% of wholesalers' procurements; on the contrary, almost 2/3 of mackerel volumes are imported. On the supply side, wholesalers' sales are equally distributed among processors (50% of sardines and 20% of anchovies and sprats), exports to foreign markets and other wholesalers (1/3 each).

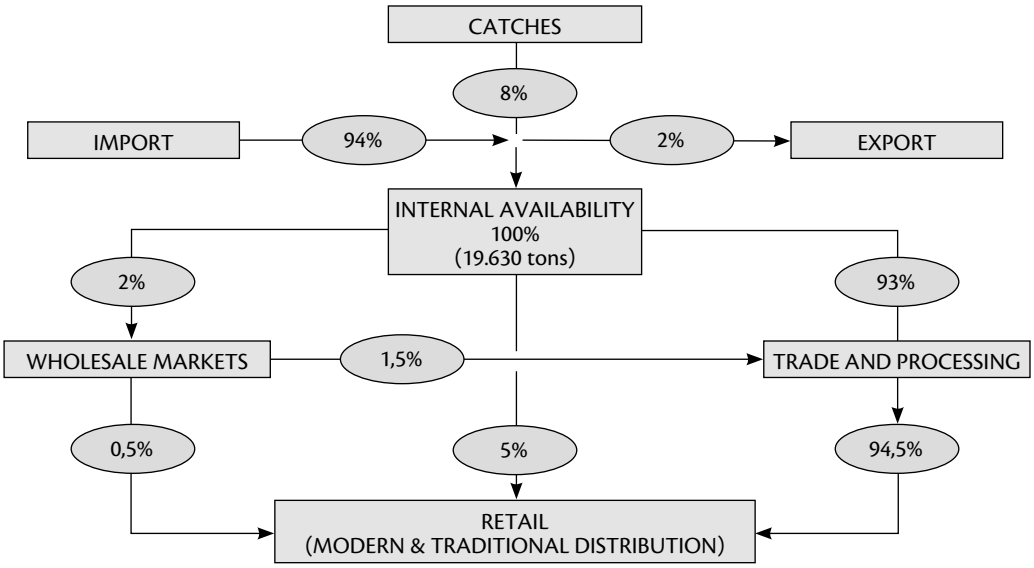
Crustacean and cephalopod supply chains have some common features, i.e. given the rather scarce catches, domestic demand is highly dependent on imports. This is why the largest share of product flows is exchanged by traders (importers), up to 90% of internal market availability. As a consequence, wholesale markets play a secondary role in the supply chain. Nevertheless, the quantity of crustaceans and cephalopods exchanged in the wholesale market is still relevant, when compared to regional catches (90%), mostly because of the large amount of mantis shrimps. Products exchanged on wholesale markets are bought by wholesalers (about 65%), fishmongers and Ho.Re.Ca. for the residual part.

The supply chain of bivalves has quite a different structure as compared to those of small pelagics and crustaceans and cephalopods, as product flows are much more concentrated. In fact, primary production is organised around producers' associations (cooperatives and consortia) that often control downstream trade and processing stages, with vertical integration strategies. Producer cooperatives and consortia, moreover, engage in positive and intense relationships with the regional socio-economic system, including other firms in the supply chain, such as traders and retailers. As a result, there is a limited number of intermediaries from production to final consumption and the value created at the retail level is fairly distributed among the actors of the supply chain.

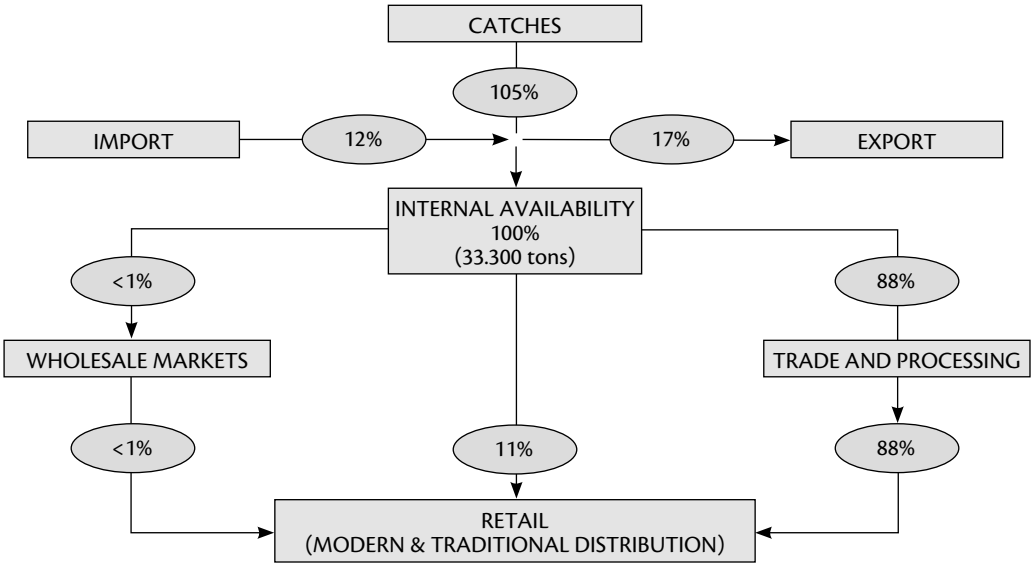
Fig. 1 - Supply chain flows of the main species of interest in Emilia-Romagna

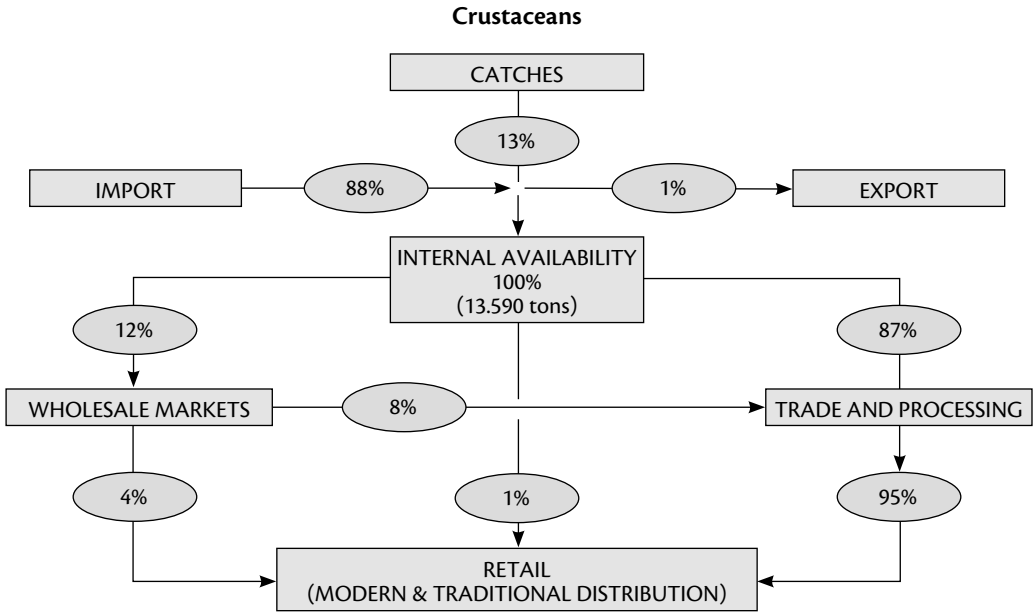


Cephalopods



Bivalves





Source: direct survey, Irepa, Ismea, Istat

4.2. Market and product perception by supply chain actors

In this section, we analyse actors' perceptions about market conditions and product attributes. A strong competitive pressure is perceived as one of the most important difficulties in building a competitive advantage. Actors experience high price variability, mainly due to supply uncertainty; price (and income) variability may induce under-investment in process and product quality, thus an under-provision of quality in the long term. In addition, price variability is exacerbated by under-supply (with respect to demand), mainly due to limited product availability; under-supply may also contribute to an increase of price on the final market.

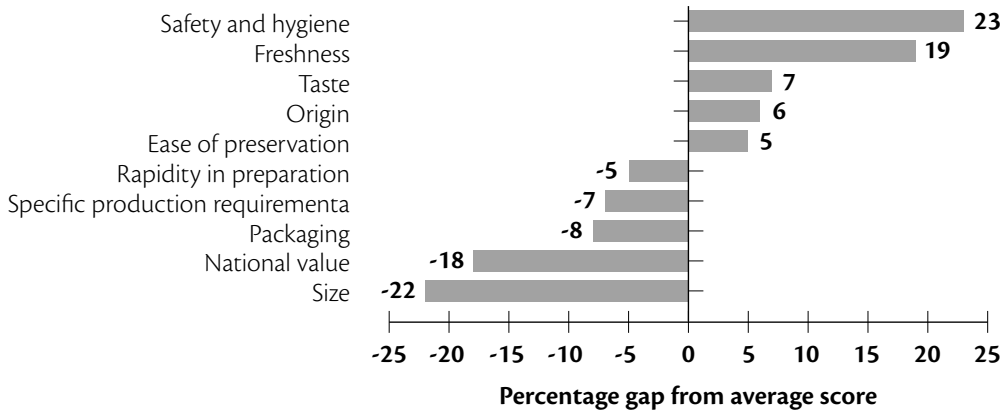
Figure 2 illustrates the relative importance of product attributes[7]: product hygiene is perceived as the most important attribute (with the highest deviation from the average score). This is followed by freshness, taste (especially for fish shops and restaurants), origin, and shelf life (the latter notably for traders, and especially for export supply chains). Conversely, packaging, nutritional characteristics, and "size" are perceived as relatively less important. It is worth noting that compliance with safety and hygiene and traceability requirements is considered a necessary condition for accessing the market and reducing market risk in the long term (loss of reputation and drop in demand in the case of shortcomings in product safety), rather than as a factor for differentiation.

The analysis reveals some crucial points concerning consumer information. The compliance with specific production requirements is perceived as "very important" by 33% of interviewees. Nevertheless, interviewees perceive difficulties in obtaining an adequate remuneration from the market for this particular attribute unless consumers are better informed about the process and product quality standards required and thus able adequately to perceive the efforts for achieving

[7] The importance of each attribute has been measured on a 5-point Likert scale. Percentages indicate the percentage gap of attribute *i* average score with respect to the average score of the whole set of attributes.

quality made by firms. Hence, if consumers are not adequately informed, they may underestimate product quality, with a negative effect on willingness to pay. This may explain why economic agents (especially fishers) tend to be "pessimistic" with regard to the possibility of obtaining a premium price on the final market based on the product's compliance with specific production requirements. The only "optimistic" category of agents is that of the points of sale (fish shops, restaurants, etc.) that are likely to benefit from a "proximity" to consumers and the consequent "direct" relationship and possibility of transmitting information about non-verifiable attributes.

Fig. 2 - Perceived importance of product's attributes



Source: authors' calculations on direct survey data

4.3. Participation in the certification scheme: expected costs and benefits

According to our survey, 83% of interviewees would participate in the certification system and associate the NASC logo with their individual brand, whilst the rest would not. Agents' strategic decision to adhere to the collective voluntary certification scheme results from a benefit-cost analysis. In this section, we analyse the main expected benefits and costs associated with the NASC, distinguishing by type of agent.

4.3.1. Expected benefits

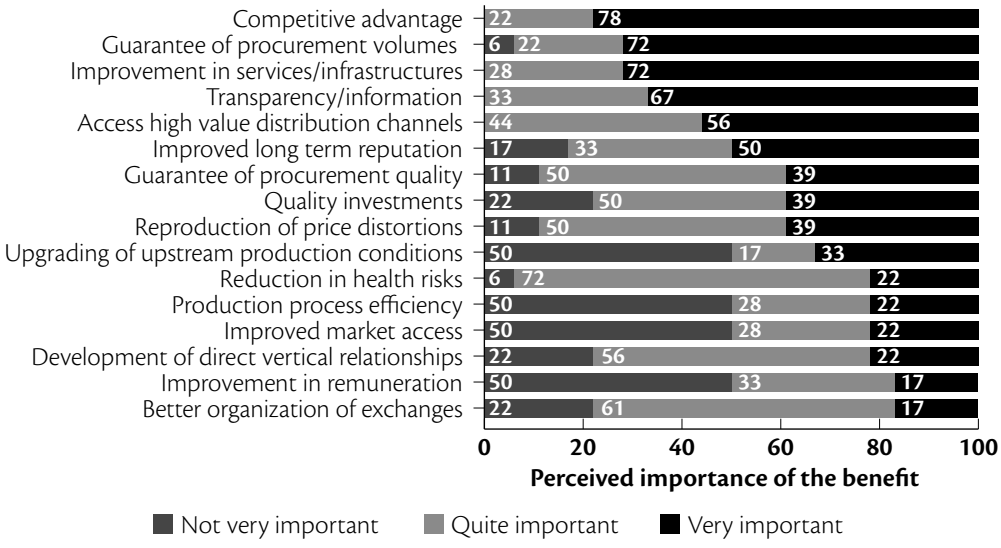
Figure 3 illustrates interviewees' perceptions of expected benefits associated with participation in the certification system[8]. Interviewees agree on the potential role of the certification system both as a quality differentiation tool and as a procurement management and control system. The importance of its role thus emerges, both as regards the final market and in the framework of buyer-supplier relationships. Indeed, 78% of interviewees consider the certification system a "very important" source of quality-based competitive advantage on the final market, with respect to the non-certified product. Hence, the quality (and food safety) improvement (raw material, production process, final product and services) may give access to more lucrative markets, increase market share and contribute to building and maintaining the collective

[8] The perceived importance of the expected benefits is measured on a three-level scale ("not very-", "quite-", "very-" important); the percentages indicate the frequency of modalities for each expected benefit.

reputation; it is worth noting that downstream agents, in particular, expect a "premium price" on the final market.

The perceived effects expected on supply chain organisation are, however, ambiguous. On the one hand, interviewees expect the certification system to facilitate the management and the control of procurement, assure procurement volumes and quality, increase transparency and thus reduce information asymmetries (and price distortions), notably in the framework of buyer-suppliers relationships; e.g. economic agents expect the certification system to improve processes of supplier selection by downstream agents (processing and retailing firms). "Standardization" and increased transparency may thus potentially favour a reduction in transaction costs and improve buyer-supplier relationships (e.g. Fulponi et al., 2006). Nevertheless, only 17% of interviewees expect a benefit in terms of a better organization of market transactions and 22% expect the creation of direct vertical relationships between upstream and downstream agents (e.g. restaurants and points of sale) indicating the role of wholesale markets in avoiding imbalances in bargaining power among supply chain participants to the detriment of upstream fishers.

Fig. 3 - Perceived importance of expected benefits



Source: authors' calculations on direct survey data

About 50% of interviewees do not really expect an improvement of upstream production conditions or an increase in the efficiency of production processes. Hence, the organisational and management constraints (and the related costs) associated with traceability and certification procedures are expected to reduce efficiency at firm-level; the potential productivity improvements associated with the normalisation procedures are not adequately perceived by the economic agents.

In addition, interviewees do not expect an increase in the remuneration of upstream agents. Indeed, the effects on the intermediary price (and notably the "transfer" of a potential premium price on the final market to upstream agents) are likely to depend on the nature of vertical relationships between downstream and upstream firms participating, as well as on the possible public

support policies aimed at facilitating the compliance process (notably of upstream producers).

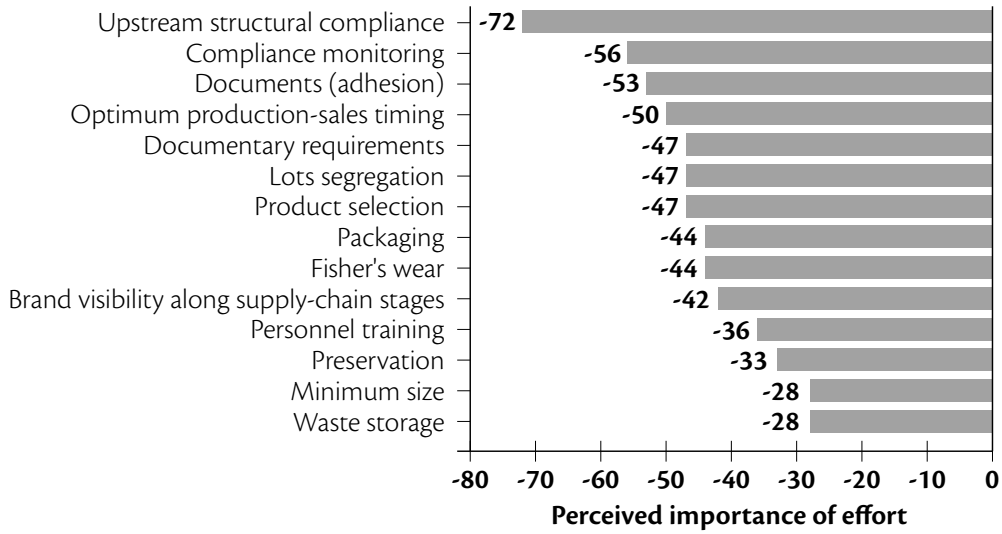
Perception of expected benefits may differ between upstream and downstream economic agents. Whilst downstream agents perceive positive effects in terms of increased transparency, reduced information asymmetries and the possibility of better management and control of procurements (thus reducing uncertainty in quantity and quality of supplies); upstream economic agents perceive the possibility of improving access to more lucrative market segments.

4.3.2. Expected compliance efforts

Participation in the certification system requires firms to comply with specific production requirements that constitute the Minimum Quality Standard (MQS) and imply both fixed and variable costs. Hence, compliance implies long term investment in the quality of production practices, labour skills, organisational and management constraints associated with the certification procedures.

Of course, compliance costs depend on the level (and the nature) of the MQS and on the "initial position" (status quo) of economic agents, with respect to the required MQS, i.e. the initial level of quality of production practices[9]. The gap between the latter and the MQS measures the extent of the compliance effort and thus influences firms' strategic incentives to participate in the system. The analysis of the perceived compliance efforts illustrated in *Figure 4* shows the current weaknesses in the compliance process and the supply chain stages involved, as well as to enabling possible areas of public support measures to be identified[10].

Fig. 4 - Perceived importance of expected compliance efforts



Source: authors' calculations on direct survey data

[9] Firms may be thus characterized by the initial level of quality of production practices and by the gap between this latter and the MQS required by the certification system; this representation points out the heterogeneity of economic agents with respect to their initial quality level. Compliance costs thus increase in the distance between the initial quality level and the MQS.

[10] The perceived importance of the compliance effort has been measured by the *ratio* between the percentage gap between the average perceived level of effort (where "high-effort=2", "low-effort=1.5" or "no-effort=1" i.e. compliant) and the situation of "no-effort=1" i.e. compliance.

First, the direct survey has made it possible to describe the initial conditions (status quo) and the most important difficulties perceived in complying with the MQS. The most crucial difficulties are identified as follows: investments in cooling equipment, difficulties in differentiating fish size (selection costs), particularly for upstream operators. Wholesale markets expect difficulties in respecting the required timing between fishing and consignment of the product. Downstream agents (processing and retailing economic agents) perceive problems in "selecting" compliant suppliers (or selecting against non-compliant ones). Hence, difficulties for downstream economic agents to "disclose" the actual quality effort undertaken by upstream agents indicates the issue of asymmetric information in buyer-supplier relationships, as well as the difficulties in implementing an adequate traceability system. In addition to these difficulties, downstream points of sale (fish-shops, restaurants, etc.) expect difficulties in respecting the standards related to product preservation (e.g. freezing).

The most important compliance effort perceived is the structural improvement of upstream production conditions. Indeed, the average level of effort is 1.72. The status quo at fishery stage is perceived as relatively inadequate, with respect to the requirements. The high compliance effort at the upstream stage may thus generate scarce participation of upstream economic agents and, consequently, a relatively scarce supply of certified product (with consequences on the structure of the "certified supply chain", on final prices and territorial extension of sales).

Finally, support policies aiming at facilitating the upstream compliance process have to be focused not only on financial support mechanisms but on information and education activities, public-private debates and partnerships. In addition to difficulties in the compliance process for the upstream production stage, important difficulties perceived concern documentary requirements, compliance control and monitoring activities, lot segregation, and product selection, at each stage in the supply chain followed by storage of waste, the compliance with a minimum size, product preservation and staff training.

Perception of efforts for compliance also depend on the type of agent. Upstream fishers perceive structural investments, product selection and the minimum size as the most important efforts, whilst wholesale markets perceive structural investment, lot segregation, documentary requirements, and compliance monitoring as the most important efforts. Documentary requirements, lot segregation, and the fishery-to-sales timing are perceived as particularly important by downstream agents.

5. Possible effects on supply chain organization

After the description of the supply chain organisation in section 4.1, and the main results of the direct survey, some considerations about the possible effects in terms of supply chain structure and organisation can be presented. In fact, the voluntary participation of upstream and downstream agents in the PCAA certification scheme may modify the existing supply chain structure either through the creation of an intermediate market for the certified product or by the development of individual contractual relations between upstream and downstream agents. Hence, we argue that the two following main forms of vertical coordination may emerge:

(i) Vertical coordination is achieved through intermediate (spot) markets.

In this case, vertical relations between upstream and downstream agents are "managed" through the wholesale market, where the third-party certification guarantees a "higher qual-

ity" with respect to the "traditional" spot market. It appears that, when collective standards are concerned, vertical coordination is realized through spot markets, rather than individual relations between upstream and downstream firms (see for example Giraud-Héraud et al. 2012). A "high-quality" (or certified) spot market may thus emerge beside the traditional (or generic) spot market; in order to guarantee the coexistence (and segregation) of the "standard"- and "certified-product", the traditional wholesale markets should develop logistic platforms and service centres. Of course, this "certified-spot market" is attained (or endogenously determined) through the voluntary adhesion of upstream and downstream agents. Producers have incentive to participate in this initiative if the expected remuneration on the intermediary market is higher than the expected compliance effort (section 4.3), otherwise they continue to supply the generic spot market. Survey results showed that the expected premium price anticipated is relatively low, whilst high compliance costs are expected for structural upgrading of upstream production conditions.

Since the remuneration on the spot market is given by the balancing of supply and demand, it partially results from the proportion of upstream and downstream agents adhering to the certification scheme. The higher is the proportion of downstream agent participating, the higher is the intermediary price (in the certified market), and thus the higher the incentive for upstream agents to participate. Hence, a "large commitment" of downstream agents to participate may provide an incentive for upstream adhesion. Nevertheless, the adhesion of downstream agents depends, in turn, on several factors. First, as in the case where a signalled initiative is concerned, the extent of the premium price obtained on the final market will be taken into account. The empirical analysis shows that the premium price expected by downstream agents is relatively low. Second, since the quality differentiation initiative has a collective nature, the free riding phenomenon may arise with negative repercussions on retailers' individual reputation. Anticipation of such opportunistic behaviour may discourage firms from participating and may prompt them to prefer individual quality differentiation strategies. Hence, it appears from the empirical analysis that downstream agents perceive the risk of reputation loss due to the free riding phenomenon and the necessity to of developing adequate control tools that monitor agents' behaviour and protect quality (and reputation) in the long term.

(ii) Vertical coordination is achieved through individual contracts (or more informal relations) between upstream and downstream firms.

As a collective initiative is concerned, vertical coordination is likely to be realized through intermediary markets rather than individual contracts between upstream economic agents (fisheries) and downstream agents. Nevertheless, if an "individual" vertical relationship exists, economic agents may have an incentive to take part in the collective initiative. It appears that the participation may occur in at least two different cases:

a) when a direct relationship exists between a fish shop (or a restaurant) and one or a few "boats", addressed mainly to a "local" market, or a niche market (low-quantity / high-price strategies), the participation in the collective brand may provide access to the collective reputation and associate the individual economic agents with particular geographical origin, and related cultural and human values. However, the risk of opportunistic behaviour may discourage individual agents from participating, especially when the individual firm has a strong individual reputation;
b) when a direct relationship already exists between a downstream processing and/or retailing firm and individual (or associated) fishers, where the downstream firm develops individual differentiation strategies (based on its own brand) and decides to participate in the collective

initiative, e.g. to improve the organisation of procurement (e.g. reduce the costs of supplier selection or contract setting, as well as control and certification costs).

In this sense, participation in the collective initiative and individual quality differentiation strategies may be complementary. In this case, again, the risk of opportunistic behaviour may discourage individual agents from participating, especially when the individual firm has a strong individual reputation.

However, economic agents might have incentives to develop individual contracts in order to organise procurement of the certified product and thus coordinate on volumes, transport, and logistic conditions, production specifications being regulated and certified by third parties; individual contracts (and the related control and monitoring procedures) may also be stipulated to preserve individual reputation from the consequences of opportunistic behaviour related to the collective initiative and, more in general, to reduce the market risk in the long term. Indeed, it appears that 56% of interviewees would develop contractual agreements for the procurement of the certified product, in order to specify volumes, and transport/logistic specifications.

6. Concluding remarks and recommendations

The research focussed on the factors that may provide incentives to economic agents to participate in voluntary quality certification schemes and the possible consequences for the organisation of the supply chain. The PCAA case study was investigated by means of a direct survey that focussed on supply agents' perceptions of the main problems associated with the implementation of the collective initiative and the perceived intervention (support) mechanisms that would guarantee the effectiveness of the certification scheme.

As a first result, we observe that production specifications required by the certification scheme are not always perceived as consistent with consumers' expectations, whilst they are considered a relevant limit for firms' strategic flexibility. In addition, agents perceive a relatively low degree of effectiveness in communication of brand names. These factors, however, may affect the possibility of achieving a premium price on the final market.

Interviewees suggest the public-private definition of a *strategic plan* clarifying marketing strategies of the certified product, as well as a public-private co-regulation where production specifications are jointly defined by the public authorities and the private supply chain actors, taking into account the actual market expectations. Inadequate perception by consumers of the distinctive attributes of the product (i.e. quality underestimation) may have negative consequences on their willingness to pay and ultimately affect the size of the premium price. Firms' anticipation of an inadequate remuneration on the final market may, in turn, discourage the firm from participating in the collective initiative or, more in general, reduce the quality effort.

Secondly, the survey pointed out difficulties in the structural adaptation of upstream production conditions. As illustrated in section 4.3, upstream agents' incentive to participate depends on the expected remuneration relative to compliance costs. However, expected benefits might be inadequately perceived by upstream agents, since atomisation of upstream supply exacerbates information asymmetries along the supply chain. In this context, cooperatives or producers' organisations may play a crucial role. First, they may favour horizontal coordination among suppliers and improve their bargaining power vis-à-vis downstream actors. Second, they may favour the exchange of information and provide technical assistance and support to the producers' compliance process.

A third group of results concerns the expected benefits and compliance costs from participation in the certification scheme. The interviews pointed out that the strategic incentive to adhere to the voluntary certification system differs between upstream and downstream agents. More precisely, while upstream agents' incentive to participate will essentially depend on the possibility of obtaining an adequate remuneration on the "certified market", the incentive for downstream agents to participate will depend on the amount of the premium price on the final market.

Overall, the participation in the certification scheme of both upstream and downstream agents depends crucially on the effectiveness of mechanisms preventing the emergence of opportunistic behaviour and thus reducing market risk in the long term. In fact, supply chain agents perceive the risk of opportunistic behaviour (notably, the *free riding* phenomenon) that could menace the level of quality (and the collective reputation) in the long term. If certification and control procedures designed to sanction opportunistic behaviour are inadequate they may cause inefficiencies: this may either discourage investments in quality upstream (and thus reduce the average quality in the long term) or increase selection and monitoring costs for downstream agents (that, in the end, increase consumer price). Hence, quality control (and sanction) mechanisms must be designed in order to prevent opportunistic behaviour.

The results of the study suggest that, in order to implement the collective certification scheme effectively, policy makers should undertake complementary initiatives and private agents should adjust their organisation and strategies accordingly. A critical aspect to be improved is communication to final consumers and information transmission along the supply chain; this can be attained by means of joint promotional campaigns on the media and special events involving all the stakeholders. Moreover, new marketing systems, involving a restricted number of actors and exploiting the potential of local fishery products in the region of origin are recommended. Another important issue is horizontal coordination, notably at the production stage. The internal cohesion of cooperatives and producer associations needs to be strengthened and the process of structural and organisational adaptation to the requirements of the certification scheme should be supported with technical assistance and professional training initiatives. Furthermore, technological adaptation and process and product innovation should be encouraged at all stages of the supply chain, by means of incentives and initiatives for transfer of technology. Finally, policy makers must enforce objective certification procedures and an effective control system, with severe penalties against opportunistic behaviour, in order to ensure benefits of the collective brand for both consumers and supply chain agents in the long run.

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