Applying an Analytical Network Process (ANP) to measure the contribution of agricultural landscapes to local development

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Abstract - **There is increasing recognition that agricultural landscapes can offer opportunities for the socio-economic development of rural areas. In our study we assess causal connections between actors, goods provided in agricultural landscapes, socioeconomic benefits created by these goods and the contribution of such benefits to regional competitiveness. We use an Analytical Network Process conducted in 9 European study regions. The results show, that various elements impact on the landscape valorisation system. Agricultural production still plays a key role; however, also public goods lead to socioeconomic benefits. Differing regional conditions influence the importance of single elements playing a role in the system.**

INTRODUCTION

In recent years it is increasingly discussed that agricultural landscapes provide private and public-good type services which represent a resource not only for local residents but also for different sectors of the rural economy, such as agriculture, forestry, tourism or the trade and services sector (De Groot *et al.,* 2010; Haines-Young and Potschin, 2010; Cooper *et al.*, 2009). However, the chains of cause and effects between the supply of services from landscapes and the development of rural regions still remain unclear. Particularly this is due to the fact that socioeconomic benefits from the use of landscape services are often are multi-staged and multi-faceted and therefore difficult to assess (Cooper *et al.*, 2009). Our study aims at investigating the causal connections between the provision of private and public goods in agricultural landscapes and the development and competitiveness of rural areas. Therefore we apply an Analytical Network Process (ANP), supported by qualitative stakeholder validation in 9 case study areas in EU and EU candidate countries.

METHOD

The Analytical Network Process (ANP) is a multi-critria analysis (MCA) technique firstly proposed by SAATY (1996). With using ANP we meet the recommendation to involve stakeholders in the process of answering socially relevant questions especially in the field of environmental and rural development research (Prager and Freese, 2009). Furthermore, we are able to overcome some of the limits of monetary evaluation of non-tangible benefits, which characterize many links in the "landscape – economy system" (Hall *et al.,* 2004). To identify the network of components and elements reflecting the relations between landscape and regional competitiveness, we refer to the framework of van Zanten *et al.* (2013). On this basis our network reflects relations between economic actors, supply of private and public good type landscape services, socio-economic benefits created by the consumption of landscape services and the contribution of these benefits to regional competitiveness. The specific control criterion of our network is "landscape valorisation" (see Fig. 1).
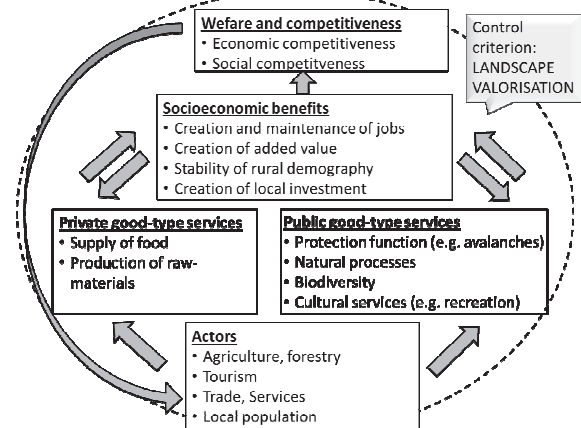

Figure 1. The analytical "landscape valorisation" network (own figure).

The influence of the single elements in the network is evaluated in form of relative, pair-wise comparisons (Saaty, 1996). Here, every "arrow" of the network corresponds to a block of pair-wise comparisons. The evaluation is carried out via a comprehensive stakeholder panel exercise throughout 9 case study areas (CSA) located in Italy, Germany, Austria, the Netherlands, Spain, Poland, Turkey, Bulgaria and Corsica. The areas reflect different situations in EU and EU candidate countries and are large enough to cover important gradients, such as the gradient from peri-urban rural areas to remote

ones – which crucially determines the market size, e.g. related to population. Also in all CSAs landscape provides a wide range of goods and services and is not focused on one or a few. Consequently, our CSAs are faced with different natural and social basic conditions, although they are all "rural" and characterised by agricultural production varying from rather marginal up to intensive management. Considering about 10 experts per case study area, in sum 84 experts took part in the exercise.

RESULTS

The results of our study show that all clusters play important roles in the system of landscape valorisation. Table 1 shows, that "socioeconomic benefits" have the biggest impact on the landscape valorisation network as regards cluster priorities. The clusters "Actors", "Private-good type services", and "welfare and competitiveness" follow with a quite evenly distribution. As regards "public good-type services" they are considered to be the least influential in terms of landscape valorisation.

Table 1. Priority vectors of the landscape valorisation analytical network (9 CSAs, n = 84 questionnaires).

Cluster:	Factors:	Element priority	Cluster priority
Actors	Agriculture/Forestry	8 %	17%
	Tourism	2 %	
	Trade & services	3 %	
	Local population	3 %	
Private good-type services	Supply of food	12 %	18%
	Production of raw materials	6 %	
Public good-type services	Protection function	3 %	14%
	Natural processes	2 %	
	Biodiversity	3 %	
	Cultural services	6 %	
Socio-economic benefits	Creation and maintenance of jobs	9 %	33%
	Creation of added value	8 %	
	Stability of rural demography	6 %	
	Creation of local investment	10 %	
Welfare/ competitiveness	Economic competitiveness	10 %	17%
	Social competitiveness	7 %	

Within the "Actors" cluster, "agriculture and forestry" is evaluated as the outstanding actor impacting on landscape valorisation in agricultural regions. Also "supply of food" is perceived as more important than the production of raw materials in the "private-good type landscape services". Within "public good-type services", mainly cultural services, which are connected to the appearance and attractiveness of a landscape, are perceived as contributing to landscape valorisation. With a view to the overall "low" evaluation of the public goods cluster, it becomes particularly obvious, that the awareness concerning the multifaceted character of public good type landscape services, going far beyond only landscape aesthetics (e.g. protection from natural hazards, nutrient cycling, carbon sequestration, pollination, biodiversity, etc.) is still limited. Looking at the different socio-economic benefits impacting on the system of landscape valorisation, the influence of the single elements is rather evenly distributed. However, the creation of jobs and the creation of local investments appear to have a slightly higher impact than the generation of added value and the stability of the demography of rural areas. Within the cluster "welfare and competitiveness", economic competitiveness is evaluated to be a more important driver in the system of landscape valorisation.

DISCUSSION

Comparing the priorities given to the single clusters in our network, the results partly confirm that stakeholders have a higher consciousness towards consumptive and marketable goods provided by a certain environment, than towards essential but hardly discernible benefits from the use of public good-type services. A policy implication of the study is that a more efficient and continuous communication strategy between scientists, decision makers, local administrations and civil society might reduce a knowledge distance and make population aware of the public heritage provided by the landscapes they are surrounded by. At the same time the weight of different valorisation pathways can hint at priority areas for local policy design, particularly in connecting landscape-related and chain-related measures of the Rural Development Programmes.

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