AT4 (All Case Study Areas): Using an Analytical Network Process (ANP) to disentangle causal relationships between agricultural landscapes and the development and competitiveness of rural regions

Objective

The main objective of this study is to contribute to the disentanglement of the complex causal relations that exist between agricultural landscapes and the development and competitiveness of rural regions. We use the Multi-criteria Analysis (MCA) technique "Analytical Network process" (ANP) which enables us to directly involve the expertise of local stakeholders in shedding light on the cause-effect chains between local economic actors, agricultural landscapes and regional competitiveness. With using the ANP, we are able to overcome some of the limits of monetary evaluation as the method is able to assess intangible assets and benefits, which characterize many components in the "landscape – economy system". Last but not least, ANP is specifically designed to cope with complex systems characterised by the presence of loops and trade-offs – which definitely applies for the complex interrelations between agricultural landscapes and the welfare and competitiveness of rural areas.

Methodology

We first identified a network of relations between landscape and regional competitiveness (see Fig. 1). It is composed of 5 clusters of elements representing the most important economic actors in a rural economy, the most important private and public good-type landscape services provided in rural agricultural landscapes, the main socio-economic benefits created by the consumption of these landscape services and the social and economic regional competitiveness these benefits contribute to. The network is characterised by 8 relations. Three of them represent loops and feedbacks in the system, namely the connections between socioeconomic benefits and service supply and between competitiveness and actors. As the specific control criterion of our network we chose "landscape valorisation", which should be understood as the potential of generating value from the resource "local landscape".

We then carried out questionnaire-based interviews with about 10 key-actors per each of our case study areas in Italy, Germany, Austria, the Netherlands, Spain, Poland, Turkey, Bulgaria and Corsica. In these interviews we collected the actors' evaluation of the single elements' influence on the overall network. Evaluation was done in form of pair-wise comparisons between single elements of the same cluster against a control element of another connected cluster. To give an example, a question was: *"Which Actor has a more positive influence on the supply of food? Tourism or Local population? How much more important is the influence of the selected actor compared to the other on a scale from 1 - 9".* The results of these comparisons were then taken as the basis for a multi-staged matrix calculation of a final vector, which presents the priority of an element in relation to the overall control criteria of the network.

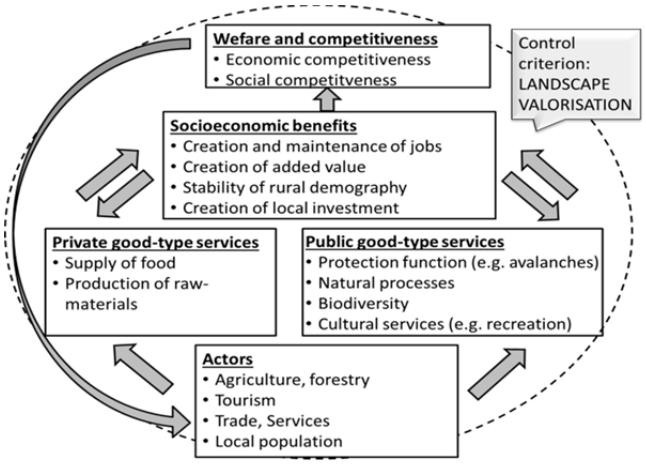

Figure 1: Analytical network (own figure based on van Zanten et al., 2014)

Results

Basically we found that in all countries all clusters were perceived to play a role in the system of generating value for society from agricultural landscapes. It became obvious that the socioeconomic benefits from the use of private and public good-type landscape service, such as the creation and maintenance of jobs, the creation of added value, the stability of the rural demography and the creation of local investment are considered the strongest drivers within the system.

Table 1: Priority vectors (Elements Priority [EP] and Cluster priority [CP] of the landscape valorisation analytical network (9 CSAs, n = 84 questionnaires)

		Study regions*																**Average all study regions**	
		IT		**DE**		**AT**		**NE**		**ES**		**PL**		**TK**		**BG**		**FR**			
Cluster	**Factor**	*EP %*	*CP %*	*EP %*	*CP %*	*EP %*	*CP %*	*EP %*	*CP %*	*EP %*	*CP %*	*EP %*	*CP %*	*EP %*	*CP %*	*EP %*	*CP %*	*EP %*	*CP %*	**EP %**	**CP %**
Actors	Agriculture	*9*	*17*	*9*	*19*	*8*	*16*	*9*	*19*	*10*	*21*	*9*	*16*	*7*	*14*	*6*	*16*	*10*	*19*	**8**	**17**
	Tourism	*2*		*3*		*2*		*2*		*2*		*2*		*2*		*3*		*1*		**2**	
	Trade & Services	*3*		*4*		*2*		*3*		*5*		*2*		*2*		*4*		*2*		**3**	
	Population	*3*		*3*		*3*		*4*		*4*		*2*		*3*		*3*		*6*		**3**	
Private good-type services	Food	*17*	*21*	*7*	*14*	*10*	*16*	*15*	*19*	*13*	*21*	*13*	*19*	*11*	*17*	*9*	*19*	*19*	*22*	**12**	**18**
	Raw materials	*4*		*7*		*6*		*4*		*8*		*6*		*6*		*10*		*3*		**6**	
Public good-type services	Protection funct.	*5*	*12*	*3*	*17*	*6*	*18*	*2*	*13*	*2*	*8*	*3*	*16*	*3*	*19*	*3*	*16*	*3*	*8*	**3**	**14**
	Natural Processes	*2*		*3*		*3*		*2*		*1*		*2*		*3*		*3*		*1*		**2**	
	Biodiversity	*2*		*4*		*4*		*3*		*2*		*3*		*4*		*4*		*1*		**3**	
	Cultural Services	*4*		*7*		*6*		*6*		*4*		*8*		*9*		*6*		*3*		**6**	
Socio-econom. benefits	Jobs	*11*	*33*	*8*	*31*	*9*	*34*	*9*	*31*	*9*	*29*	*11*	*34*	*6*	*36*	*8*	*34*	*8*	*31*	**9**	**33**
	Added value	*9*		*8*		*8*		*8*		*7*		*7*		*12*		*7*		*7*		**8**	
	Demography	*4*		*6*		*8*		*4*		*5*		*5*		*5*		*7*		*10*		**6**	
	Investment	*9*		*9*		*8*		*10*		*7*		*11*		*13*		*11*		*6*		**10**	
Welfare and compe-tetiven.	Economic competitiveness	*10*	*17*	*11*	*19*	*7*	*16*	*11*	*19*	*12*	*21*	*10*	*16*	*9*	*14*	*10*	*16*	*12*	*19*	**10**	**17**
	Social competitiveness	*6*		*8*		*8*		*8*		*9*		*6*		*5*		*6*		*7*		**7**	

*IT: Italy; DE: Germany; AT: Austria; NE: Netherlands; ES: Spain; PL: Poland; TK: Turkey; BG: Bulgaria; FR: France

It also became obvious that “agriculture and forestry” is evaluated as the outstanding actor impacting on the generation of value from agricultural landscapes. Also is the traditional role of agricultural landscapes, namely the “supply of food” evaluated as the most important service provided in agricultural landscapes. In contrast, public good-type services in most case study areas are still perceived to play a remarkably weaker role in the generation of value from agricultural landscapes. This evaluation brings to light, that the awareness concerning the multifaceted character of public goods from landscapes (e.g. protection from natural hazards, nutrient cycling, carbon sequestration, pollination, biodiversity, etc.) is still limited. Of public good type landscape services, mainly cultural services, which are connected to the appearance and attractiveness of a landscape, are perceived as contributing to value generation. Within the cluster “welfare and competitiveness”, economic competitiveness is evaluated to be a more important driver in the system of landscape valorisation.

On case study level, the different priority rankings of elements can be attributed to the inherent specialities of the single CSAs. For instance, the “*protection function*” within public good-type services (wild fires, floods, avalanches) is relevant in the Italian or Austrian CSA, whereas for instance “raw material production” is of high importance in Bulgaria.

Lesson learned & Policy Recommendations

The ANP exercise confirmed the conceptual connections between the provision of landscape services in agricultural landscape and the development and competitiveness of rural regions in all of our case study countries.

The exercise brought to light, that in general, the „classical“ agricultural system, running from agriculture to the production of food, to the creation of jobs, added value and investment and finally to the enhancement of economic competitiveness, is perceived to play the most important role in the system of generation value in agricultural landscapes.

The priorities given to private in comparison to public good-type services, partly confirm that people 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.

However, the study also showed that public goods – and especially cultural services – are still perceived as important throughout all countries. Here it could be seen, that the perception of public goods is particularly driven by regional specificities (e.g. protection function in Corsica, Austria, Italy).
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.

Last but not least this study shows, that the common structured methodology we applied in 9 CSAs, allowed for an overall, horizontal estimation as well as for an interregional comparison of the main drivers and relations in the landscape valorisation system – even if case studies were characterized by sometimes significantly different natural and socio-economic conditions.

References

Schaller, L., Kantelhardt, J., Fedrigotti, V.B., Targetti, S., Viaggi, D., Ariaza, M., Bal, T., Giray, H., Häfner, K., Örmeci Karte, C., Majewski, E., Malak-Rawlikowska, A., Nikolov, D., Paoli, J-C., Piorr, A., Ungaro, F., Verburg, P., Villanueva, A.J., van Zanten, B., & I. Zasada (2014). The contribution of agricultural landscapes to local development and regional competitiveness – an Analytical Network Process (ANP) in selected European Union and Candidate countries' study regions. *Proceedings of the 88th Annual Conference of the Agricultural Economics Society*. April 9 – 11, 2014, AgroParisTech, Paris, France

Targetti, S; Schaller, L; Villanueva, A; Arriaza, M; Bal, T; Bossi Fedrigotti, V; Giray, H; Häfner, K; Kantelhardt, J; Kapfer, M; Majewski, E; Malak-Rawlikowska, A; Nikolov, D; Örmeci, C; Paoli, J. C.; Piorr, A; Raggi, M; Rodríguez-Entrena, M; Ungaro, F; Verburg, P; van Zanten, B; Zasada, I; Viaggi, D. (2014): An analytic network process approach for the evaluation of second order effects of agricultural landscape management on local economies. *Proceedings of 14th Congress of the European Association of Agricultural economists*, August 26-29, 2014, Ljubljana, Slovenia

van Zanten, BT; Verburg, PH; Espinosa, M; Gomez-y-Paloma, S; Galimberti, G; Kantelhardt, J; Kapfer, M; Lefebvre, M; Manrique, R; Piorr, A; Raggi, M; Schaller, L; Targetti, S; Zasada, I; Viaggi, D (2014): European agricultural landscapes, common agricultural policy and ecosystem services: a review. *Agronomy for Sustainable Development* 34(2): 309-325.

Responsible partners/persons

Lena Schaller[1], Stefano Targetti[2], Jochen Kantelhardt[1], Davide Viaggi[2]
[1] University of Natural Resources and Life Sciences, Vienna (BOKU)
Institute of Agricultural and Forestry Economics
Feistmantelstr. 4, 1070 Vienna, Austria

[2] Department of Agricultural Sciences, University of Bologna (UNIBO)
Viale Fanin, 50, 40127 Bologna, Italy