PL4 (Chłapowski Landscape Park, Poland): What might be a potential impact of Landscape composition and structure on regional competitiveness?

Introduction

The presented study focuses on a development of knowledge base on the relations between landscape structure and composition, functions and benefits, and the contribution to the regional competitiveness and creation of socio economic effects of typical agricultural landscape in the case study region. There are many different definitions of the term “competitiveness” or “regional competitiveness”, as well as different competitiveness indicators used in various studies and papers (e.g. Krugmann 1994, Porter 1992, EC 1999, Porter & Ketals 2003). It became clear, that the idea of productivity and employment is a key, common link between all concepts of competitiveness, most of all in connection with the living standard of the regional population. The European Union’s Sixth Periodic Report on the Regions specifies “Regional Competitiveness” as “the ability of a region to generate, while being exposed to external competition, relatively high income and employment levels..." (EC 1999, Claim 2012). Therefore in the presented study we understand the regional competitiveness as the ability to generate income, with at the same time, assured employment and wellbeing of the society.

As the case study region we selected “Chlapowski Landscape Park” located in the Central-Western part of Poland. The region is characterized by typical agricultural lowland landscape, rich in small-structured landscape elements like field ponds, water catchments and shelterbelts. Benefits from landscape for the regional competitiveness in the Chlapowski Landscape Park are clearly connected with agriculture supported by shelterbelts and their regulating (protection) function (Johnson & Brandle 2003). This characteristic landscape element allows to increase yields of agricultural production and to produce crops which would not be grown on relatively light soils, if there was no protection against wind erosion (like sugar beets or oil-rape), (Kort 1988). Therefore increase of the regional competitiveness is mainly attributed to income from agricultural production and safeguarding employment in rural areas (in agricultural production and to a lesser extent, employment in recreation).

Objective

In the presented study we try to answer the question: what might be the potential impact of landscape composition and structure on regional competitiveness?

Methodology

Assessing influence of landscape on region competitiveness is complicated due to complexity of the issue and dependence of competitiveness also on other factors like: location, human capital and local investments, governance etc., which hide possible relation of landscape elements to regional competitiveness. What is more, there is no exact information about variables dependency, even for

those intermediate factors. Often opinions of experts about positive or negative correlation between variables represent the only available information. The lack of experimental data practically prevents from the use of classical statistical methods. Therefore we decided to use Bayesian Belief Network (BBN) for determining influence of landscape elements on regional competitiveness. The BBN is a directed acyclic graph (DAG) with a set of conditionals probabilities. A number of programs allow the development of BBN. For this analysis we used the NORSYS Software program Netica.

The BBN model was calibrated basing on expert judgement. The general model of connections between the tested variables is presented in figure 1, which shows the results in case of 50% chance of all elements of landscape being important. In the model we consider four, the most typical landscape elements in the case study Area: fields and pastures (FIELDS), shelterbelts (SHELTERBELTS), forests (FOREST), field ponds and water reservoirs (WATER). The main landscape services in the CSA are food provisioning, protection and regulating (mainly from wind-erosion), aesthetic-cultural and habitat supporting.

The following direct and second order (socio-economic) effects of the use of landscape services were analysed in the BBN of the case study region: Increase of productivity (higher yields and larger variety of crops); Maintenance and creation employment (strong agricultural sector provides employment for local inhabitants; inflow of visitors provide possibility of development of the local tourist base); Tourism and recreation (specific landscape and cultural heritage attracts tourists); Increased biodiversity (diversified landscape through its habitat supporting function contributes to rich biodiversity). In general those abovementioned functions and services provided by landscape elements and benefits deriving from its usage, contribute to higher competitiveness of the region, measured by Income effects.

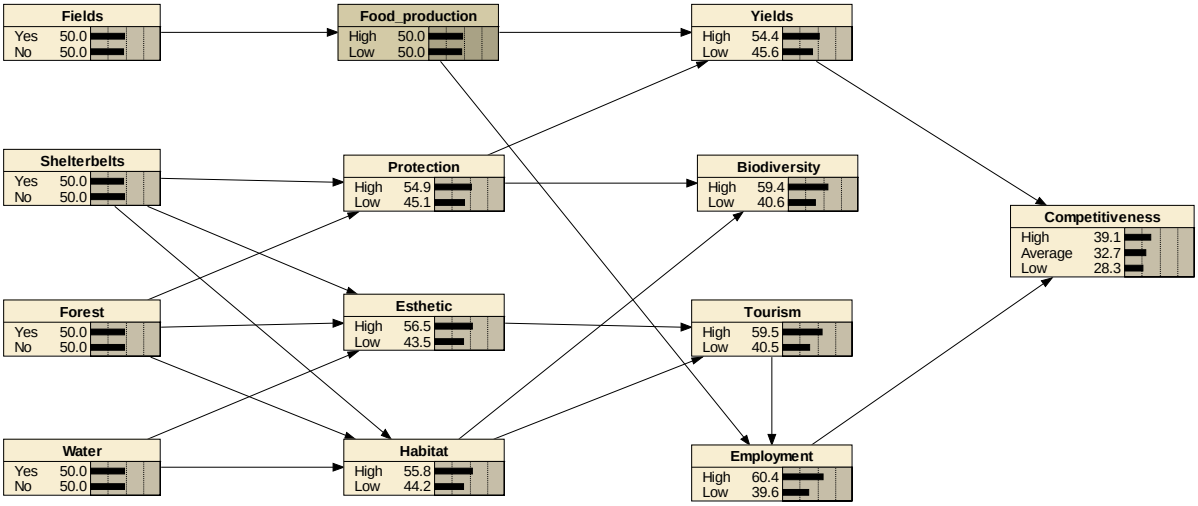

Figure 1. The calibrated BBN belief network for landscape influence on competitiveness.

Results

The changes in probabilities between the model with 0% and 100% of shelterbelts being important were analysed. It was observed that shelterbelts have a strongly positive impact on the realisation of the protection (regulating) function. The probability at the higher level is by 41.6% higher as at the low level. As it was supposed, these green pathways have a strong positive impact also on the

aesthetic appreciation of the landscape, by increasing its valorisation as high as by 26.7%. The existence of windbreaks creates also good conditions for habitat for species. The probability of realisation of this function rises by almost 30% when implementing shelterbelts within the landscape. Realisation of abovementioned services by shelterbelts contributes to generation of certain socio-economic benefits. The BBN model estimated a 10% increase of yields, 27.6% biodiversity and tourism by 21%. This in turn has an impact on increase of the local employment by 8.9%. In case of regional competitiveness there is 5% increase of a chance of achieving high level of competitiveness and 6% decrease of low level chance due to implementation of the shelterbelts.

Similar calculation was carried out for all landscape elements. While all considered landscape elements display positive influence on regional competitiveness, the agricultural land shows the strongest impact by increasing chance of high competitiveness by about 20%. Shelterbelts and forest have very similar effects with increase about 5% and water gives almost negligible change of 1.5%.

Lesson learned & Policy Recommendations

The main conclusion of the study was that all considered landscape elements (fields, forests, shelterbelts, and water reservoirs) have a positive influence on regional competitiveness and the potential of agricultural land (through its provisioning function, thus employment and economic effects). The agricultural fields and pastures have the strongest, positive impact on the competitiveness of the region showing the potential to increase the chance of high competitiveness by about 20%. Shelterbelts and forests have very similar effects with increase about 5%. Water courses show only marginal change of 1.5%. Shelterbelts, which are a unique and distinctive element of the landscape in the Chlapowski Landscape Park play an essential role in shaping natural conditions for farming in the Park area. It can be stated, that maintaining shelterbelts creates specific landscape features and increases competitiveness of the region, having an impact on productivity and profitability of agricultural sector.

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