AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Regional aspects of decision-making support for rural development in Poland

Wegener S. [1], Kiryluk E. [2]

[1] Leibniz Institute of Agricultural Development in Central and Eastern Europe (IAMO), Halle, Germany
[2] University Poznan, Department of Agricultural Economics, Poznan, Poland

Abstract— **Measures for rural development should be adapted to the specific regional conditions and national programs should allow for different regional priorities. However, decision-making for policy measures often takes place under special conditions with many concerned actors, unstructured decision problems and time pressure. These conditions, decision-makers in administrations and institutions are faced with, make the formation of policy-measures for rural development a complex matter. Thus, there is the question arising how decision-makers can be supported in setting priorities for allocating budgets for policy measures among regions. Recently, multi criteria decision-making approaches are discussed to tackle these kinds of decision problems. We show exemplarily for the Polish program of rural development, how decision-making could be supported using a multi-objective programming approach. Different preferences of actors can be considered explicitly by visualizing "trade-offs" and an interactive use of the approach. For example, a political "equity" objective is implemented as a constraint in the programming approach, restricting the budget differences between regions to a defined level. By a parameterization of the bound for budget differences, the "trade-off" between three objectives is displayed and evaluated. Using the exemplary programming approach, it is shown that the objective values of the two main objectives of the PROW decline, when the budget differences between regions are restricted for pursuing a political "equity" objective.**

Keywords— **Regional Budgeting, Interactive Decision-making support, Multi-objective Programming (MOP)**

I. PROBLEM SETTING

Since the accession to the European Union (EU) in 2004, Poland implemented two programmes for rural development, namely the Rural Development Plan (Plan Rozwoju Obszarów Wiejskich – PROW) and the Sectoral Operational Programme (SOP), co-financed by the EU structural funds. Due to historical reasons, there is no tradition of a regional formation and implementation of policy measures and an institutional framework for a regionally specific design of measures has still to evolve [2].

Nevertheless, economical and structural conditions differ greatly between the Polish regions [11], [3]. Therefore, measures for rural development should be adapted to the specific regional conditions and national programmes should allow for different regional priorities to improve the effectiveness of policy programmes [1].

On the other hand, it is a difficult question, if measures should rather support those regions, which possess the biggest potential, or if measures should rather support disadvantaged regions, or if equity in the budget distribution should play a role. Problems of allocating budget amongst regions are also discussed, e.g., by [4] and by [6], who use quantitative models in their analyses. However, it remains difficult to make general conclusions.

Moreover, the difficulty in setting regional priorities is not the only one decision-makers face when formulating policies for rural areas. In general, they have to agree on objectives, operationalize the objectives, assess the impact of measures on the objectives, and consider institutional, budgetary, and other restrictions. This decision-making for policy measures often takes place under special conditions with many concerned actors, unstructured decision problems and time pressure. These conditions, decision-makers in administrations and institutions are faced with, make the formation of policy-measures for rural development a complex matter. Thus, there is the question arising how decision-makers can be supported in setting priorities for allocating public investments and budgets of policy measures for rural development among regions.

II. METHODS

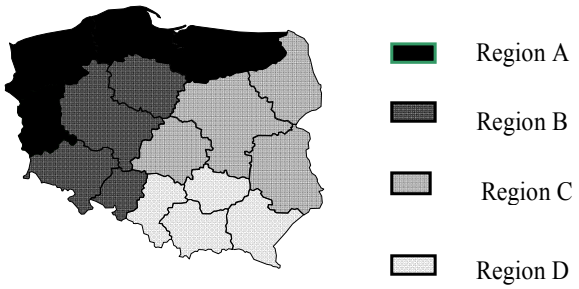
Munda [9], [10] proposes the use of multi-criteria decision-making methods for these kinds of decision problems, as the normative component and the described special conditions can be explicitly considered. Jechlitschka et al. [7] propose an interactive, linear, and multi-objective programming approach to support the formation of policies for rural development. The main idea is to build small and simple enough models, which are specific to a certain problem, and to develop and use these kind of models interactively together with decision-makers, thus helping to structure the problem, improving the transparency of the underlying assumptions and to facilitate communication amongst decision-makers.

In our contribution, we apply the approach proposed by [7] to the PROW in Poland, in order to demonstrate in an exemplary way how it can be used for regional specific budgeting and priority-setting. For this purpose, we analyse the implications of varying priorities for the official objectives of the PROW ("competitiveness" and "sustainable development") using the weighted sum method. In addition, a political objective "balanced budget distribution between regions" ("equity") is considered as constraint. This objective is implemented in the programming approach as a bound on the budget differences between regions. By parameterising the weights for the objectives and the bound on the budget differences, relevant trade-offs can be revealed and can become subject of discussion of decision-makers in an interactive use of the model.

In order to assess the varying conditions of the regions according to policy measures, a survey was conducted asking 800 farmers from different Polish regions. In this survey farmers assessed the impact of measures on the objectives of the PROW on a scale between one (low impact) and nine (high impact). The arithmetic means of these estimations were used in the programming approach as coefficients of the objective function. Therefore, the approach analyses priority-setting only exemplarily from the farmers' point of view, distinguishing between different regions.

A classification of Polish rural areas has been done, e.g., by [12], [13] using different methods and indicators. In general, there is a clear division between the more developed West and the less developed East. Our study is based on the typology of rural areas developed by the Institute of Agriculture Economics and Food Economy (IAEFE) during the implementation of the Farm Accountancy Data Network (FADN) program [5]. It divides rural areas in Poland into for regions (A: Pomorze and Mazury, B: Wielkopolska and Sląsk, C: Mazowsze and Podlasie, D: Malopolska and Pogórze), according to the development structure (figure 1).

Fig. 1 Selected agricultural regions of Poland



Source: Own picture.

We discuss an exemplary model, since it has not been developed and used interactively in workshops with different groups of actors and all equations but the objective function are based on official data and our own assumptions. However, we demonstrate exemplarily how this method can be used for better considering regional and normative aspects of priority-setting and to support decision-making. This is not only relevant for Poland but also in general for decision-making on policies for rural areas, as there is a growing need for regionally adapted policy measures and a lack of appropriate methods to explicitly support the decision-making process in practise.

Table 1: Farmers' impact assessments of PROW measures

	Early retirement	Less favoured areas	Agri-environment	Semi-subsistance	Afforestation	Producer groups	EU standards
Objective 1 - Competitiveness							
Region A	5,38	6,05	5,97	5,80	4,83	6,37	7,11
Region B	6,06	6,33	5,65	6,12	4,10	5,19	5,98
Region C	4,99	6,29	4,76	6,41	4,31	5,88	6,77
Region D	7,22	5,77	4,72	6,56	5,16	5,77	5,97
Objective 2- Sustainable development							
Region A	7,58	7,25	6,66	6,99	5,81	6,55	6,50
Region B	6,56	6,64	5,55	6,24	4,15	4,63	5,54
Region C	7,18	6,82	5,52	6,33	4,83	5,09	5,68
Region D	7,37	5,48	4,34	6,23	4,52	5,05	5,60

(Arithmetic means of Delphi assessment– scale: 1 – low impact – to 9 – high impact)
Source: Own survey and calculations.

III. RESULTS

Table 1 shows the results of the survey. The regional differences of the impact assessments are significant.

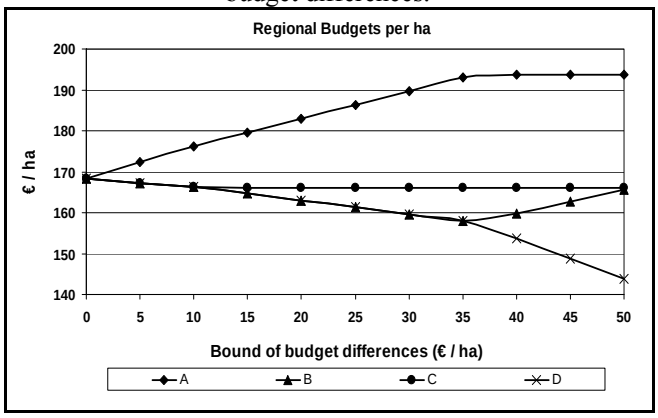
By using graphical visualizations of the different budget allocations at different weights resulting from the programming approach, decision-makers get insights to the solution space and receive information about “trade-offs” between the single measures. It is shown which measures are decreased/increased when the weights are changed. In addition, those intervals of weights can be identified in which the solution is stable. In further analyses it can be calculated how these "trade-offs" change, when the conditions of the model are changed in certain policy scenarios, like a reduced state budget.

In addition, a political "equity" objective can be implemented as a constraint in the programming approach, restricting the budget differences between regions to a defined level (in € per ha). By a parameterization of the bound of budget differences, the "trade-off" between the three objectives can be displayed and evaluated. Using the exemplary programming approach, it can be shown that the objective values of the two main objectives of the PROW decline, when the budget differences between regions are restricted for pursuing a political “equity” objective.

Figure 2 depicts the budget distribution between the regions at different bounds of the budget differences. It shows which regions lose and which regions gain, when the bound of budget differences between regions is changed. The final judgement is left to actors considering these gains and losses as well as the respective values of the objective function.

With a rising bound of the budget differences between regions from 0 €/ha to about 15 €/ha, budget of the regions B, C, and D is allocated to region A. With the bound rising from 15 €/ha to 35 €/ha, budget is allocated from the regions B and D to region A, while the budget of region C stays constant. Between 35 €/ha and 50 €/ha region A reaches an upper limit at about 40 €/ha and stays constant, while budget is allocated from region D to region B.

Fig. 2: Regional budgets (A, B, C, D) at different bounds of budget differences.

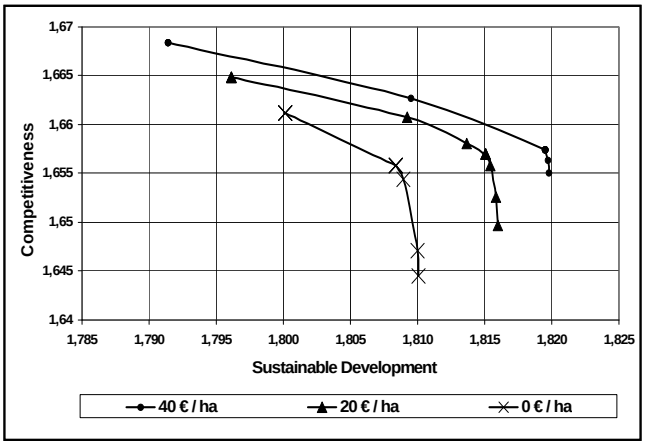


Source: Own picture and calculations.

At a bound of 50 €/ha the difference between region A and D amounts exactly to 50 €/ha. That is why the budget of D is increased when the bound is lowered from this point below 50 €/ha. At bounds below 35 €/ha this applies accordingly to the region B and below about 10 €/ha to region C. At bounds above 50 €/ha the restriction is not binding anymore. If the budget allocation between regions was not limited, region A received 193.8 €/ha, regions B and C received 166.02 €/ha each, and region D received 143.25 €/ha.

In addition, it is of interest how the "trade-offs" resulting from a weight parameterisation would change when the bound of the budget differences between regions is changed. For this purpose, additional weight parameterisations for different levels of the bound on budget differences can be carried out. Figure 3 depicts the resulting "trade-off" curves for budget differences between regions being bound to 40 €/ha, 20 €/ha and 0 €/ha. The points in Figure 3 mark the different absolute levels of the objectives resulting from the respective weight parameterisation.

Fig. 3: Trade-off between objectives at different bounds of regional budget differences



Source: Own picture and calculations.

Figure 3 shows, first, that lower values of the objective function are realised when the budget allocation between regions is restricted to lower differences in €/ha. The highest level of the objective function is achieved with a bound of 40 €/ha, the lowest with a bound of 0 €/ha and a bound of 20 €/ha being in between. Second, the values of the objective "sustainable development" decrease/increase most at low weights for the objective "sustainable development". The rates of change of the objective "competitiveness" are less uniform. Furthermore, at higher weights for "sustainable development" there is an interval in which an increase of the weight results only in losses for “competitiveness” with no major gains in "sustainable development". Third, the "trade-off" curves have a different shape and different intervals between the maximum and minimum objective levels. The interval between the maximum and minimum level of the objective "sustainable development" becomes smaller with more restricted budget differences between regions. In contrast, the interval between the maximum and minimum level of the objective "competitiveness" becomes bigger with more restricted budget differences between regions. The advantage of the visualisation of such "trade-off" curves is the quick overview of the different non-dominated solutions.

Decision-making for policy programs on rural development and regional priority setting contains a normative component with incommensurability of values and preferences of different actors [9]. Considering the budgeting for the Polish PROW, it was exemplarily demonstrated how a multi-objective programming approach could be used to tackle the problem of regional priority setting for policy measures. The basic idea is to build and use a multi-objective programming approach interactively together with decision-makers and other actors.

Due to the missing unit of measurement and incommensurability of values and preferences, the evaluation of the "trade-offs" and modelling results has to be left to actors in interactive workshops. By comparing the occurring changes in the values of the objective functions, actors can discuss different non-dominated budget distributions on a transparent basis. However, the problem of an application of the programming approach to a real decision-making problem [8] is to find a good balance between the inherent complexity of multi-objective decision-making problems and the need to keep the model and the results simple enough for the practical application under time-pressure and with different actors.

REFERENCES

1. Bański, J. (2003) Transforming the functional structure of Poland's rural areas. In: Bański, J.; Owsiński, J. (Eds.) Alternatives for European Rural Areas, Warsaw, IERiGŻ
2. Baum, S.; Weingarten, P. (2005) Interregionale Disparitäten und Entwicklung ländlicher Räume als regionalpolitische Herausforderung für die neuen EU-Mitgliedsstaaten. Agrarwirtschaft 54(4):210-224
3. Baum, S.; Trapp, C.; Weingarten, P. (2004) Typology of rural areas in the central and eastern European EU new member states. (IAMO discussion paper 72), Halle, IAMO
4. Caminal, R. (2004) Personal redistribution and regional allocation of public investment. Regional Science and Urban Economics 34(1):55-69
5. FADN (2004) Plan wyboru gospodarstw rolnych do polskiego FADN, Warszawa, IERiGŻ
6. Fuest, C.; Huber, B. (2006) Can regional policy in a federation improve economic efficiency? Journal of Public Economics 90(3):499-511
7. Jechlitschka, K.; Kirschke, D.; Schwarz, G. (2007) Microeconomics using Excel – Integrating economic theory, policy analysis and spreadsheet modelling. London, New York, Routledge
8. Kaliszewski, I. (2004) Out of the mist – Towards decision-maker-friendly multiple criteria decision making support. European Journal of Operational Research 158(2):293-307
9. Munda, G. (2005) Multiple Criteria Analysis and Sustainable Development. In: Figueira, J; Greco, S.; Ehrgott, M. (2005) Multiple Criteria Decision Analysis: State of the Art Surveys. New York, Springer Science+Business Media, Inc
10. Munda, G. (2004) Social multi- criteria evaluation: Methodological foundations and operational consequences. European Journal of Operational Research 158(3):662-677
11. Poczta W.; Mrówczyńska A. (2002) Regionalne zróżnicowanie polskiego rolnictwa. Zróżnicowanie regionalne gospodarki żywnościowej w Polsce w procesie integracji z UE, (red.) W. Poczta, F. Wysocki, Wyd. AR Poznań
12. Rosner, A. (2002) Zróżnicowanie przestrzenne obszarów wiejskich pod kątem widzenia struktur gospodarczych. In: Rosner, A. (Eds.) Wiejskie problemy kumulacji barier rozowjowych. PAN, Warszawa
13. Stola, W. (2004) Regionalne zróżnicowanie struktury funkcjonalnej obszarów wiejskich w Polsce. In: Bański, J. (Eds.): Polska przetrzeń wiejska: procesy i persektywy. Warszawa

Corresponding author

- Author: Stefan Wegener
- Institute: Leibniz Institute of Agricultural Development in Central and Eastern Europe (IAMO)
- Street: Theodor-Lieser-Straße 2
- City: 06120 Halle
- Country: Germany
- Email: Wegener@iamo.de