Modelling Decision Making in Communal Areas: the Identification of the Utility Function

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INTRODUCTION

In the Kavango Region (North-eastern Namibia) the natural resource base is partly degraded depending on rainfall, population density and actual land use. The average rainfall is 550 mm per annum and the natural vegetation consists of dry forest and tree savannah. The dominant farming system can be described as a mixture of subsistence crop and livestock production. Villagers in this region face imperfect labour markets, high transaction costs and a poor infrastructure. Their nutrition is highly based on natural resources, is barely supplemented by purchased groceries and is frequently endangered by environmental conditions.

OBJECTIVE

The object of this case study, embedded in the *BIOTA-Africa South Project*, is to construct a dynamic bio-economic model of a communal village. The objective function of the model is maximizing utility subject to several constraints. The focus of the recent research phase was laid on identifying the utility function with a modified conjoint analysis (CA) approach. CA is a method that raises values for the overall utility on the basis of preference judgments of decision makers in a given choice setting. In general this method is used in market research.

Table 1: Relevant factors and corresponding levels

Factors	Level_1	Level_2	Level_3	Level_4
Animal production activities (APA)	0 cattle / 0 goats	10 cattle / 6 goats	20 cattle / 11 goats	30 cattle / 17 goats
Crop production activities (CPA)	Insufficient	Sufficient	Surplus	
Other activities using natural resources (OAUNR)	Sufficient	Surplus		
Off-farm labour activities (OLA)	0 N$/ month	100 N$/ month	300 N$/ month	600 N$/ month
Family, cultural and social activities (FCSA)	4 days/ month	8 days/ month	12 days/ month	

METHODS II

For CA interviews respondents were asked to consider each profile card as a possible future life situation. The following interview procedure was used.
• Explanation of the approach with information sheets and two example cards.
• Rough sorting of profile cards in three piles 'prefer' 'reject' and 'neither prefer nor reject' (see picture 1).
• Final ranking of the different piles regarding the preferences of respondents. This was facilitated by a magnetic board on which all cards of the different piles were visualised (see picture 2).
• Summarising the different part orders in one global order.

Picture 1: Rough sorting

Picture 2: Final ranking

METHODS I

For the experimental design of CA different stimuli (bundles of concrete levels of considered factors) are presented to respondents which consist of desirable and non-desirable levels of the considered factors. This imposes respondents to weight the importance of the different factors relative to one another.
The five relevant factors for this case study and their corresponding levels were identified during interviews with key-informants (see table 1).
An orthogonal design was produced by SPSS with 20 profile cards (including 4 holdout cards). The profile cards exclusively consisted of pictures (see material 1). Information sheets for the five factors were designed, which explained the different factor components, factor symbols and factor levels (see material 2). A combination of the full profile method and the ranking technique was used for interviews of altogether 66 households in 4 villages.
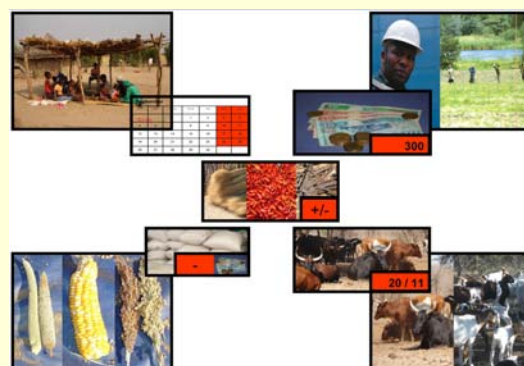
Material 1: Example profile card

Family, cultural and social activities = 8 days/ month

Off-farm labour activities = 300 N$/ month

Other activities using natural resources = sufficient

Crop production activities = insufficient

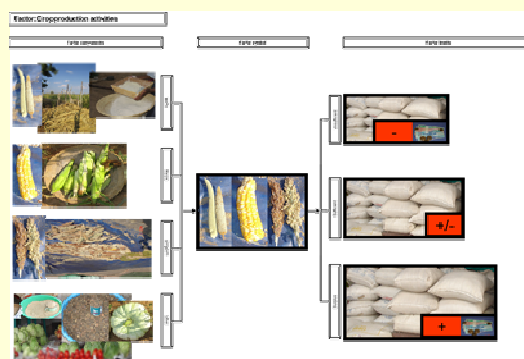Animal production activities = 20 cattle/ 11 goats

Material 2: Example information sheet for crop production activities

Factor components

Factor symbol

Factor levels

FIRST RESULT

First data analysis shows that animal husbandry is the most important household activity. Subsequently off-farm labour followed by crop production activities show significant utility levels (see figure 1).

FIRST CONCLUSION

The acquisition of assets and cash income represents the main objective of communal farmers. Animal husbandry signifies the most important household activity although it is characterised by low management efforts.
However, the increase of livestock and field numbers will contribute to further degradation of the rangelands and forests. This will cause a supplementary instability of the eco-system and thus the nutrition base.

Figure 1: First result

Importance of different activities
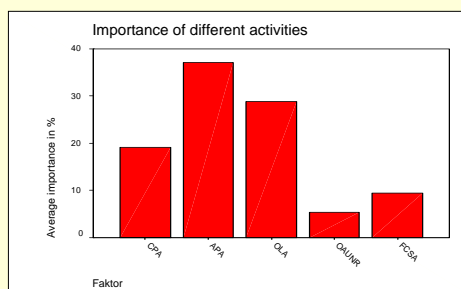
OUTLOOK

Further data analysis has to prove whether there are differences in objectives between age, sex and status (livestock owner/ non livestock owner) groups. Moreover, it will be investigated if the location of the village has an influence on the preference judgements of the inhabitants.

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