Research Proposal: Master Thesis Business Economics

General Information

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Title: Farm Optimization for Oil Producing Regions in Ethiopia; *Case of Jimma Region*

Background

Agriculture is the most important sector of the Ethiopian economy in terms of income, employment and revenue generation. According to Hagos et al (2006), agriculture's contribution to GDP, although showing slight decline over the years has remained very high. Currently, agriculture employs 80% of labor and accounts for 47% of the GDP Wijnands etal (2009). Crop production is the major contributor to GDP of all agricultural activities. The peasant sector, which produces more than 90 per cent of crop output has simple farming technology, acute shortage of purchased inputs particularly fertilizer, little infrastructure and inefficient marketing systems (Arbrar et al, 2004).

The oilseeds sector is one of Ethiopia's fastest-growing and important agricultural sectors, both in terms of its foreign exchange earnings and as a main source of income for over three million Ethiopian farmers. It is the second largest source of foreign exchange earnings after coffee. Study reports indicate that Ethiopia is among the top-five producers of sesame seed, linseed and nueg or Niger seed (Wijnands et al, 2009). Despite its current significance, stakeholders are mainly convinced that the oilseed production in Ethiopia hasn't reached its climax. Gelalcha (2009) and Wijnands et al (2009) asserted that the potential for further growth, both in terms of quantity and quality, through improved production techniques and productivity factors is considered to be great. In line with this, evidence shows there is a growing export of oilseed from Ethiopia to the rest of the world in general.

The productivity of oilseed crops in Ethiopia can be explained by a variety of variables. Regional configuration, the soil nutrients, fertilizers, weather condition, labor, crop rotation and expertise level are among the determinants. These variables apply in the same manner to other crops' production. Cereals and pulses are the two major crop catagories that compete for all resources with the oilseeds. Hence, in the event of farm optimization, it is important to keep the perspective on all the crops on a certain farm land. As far as we know, there is no optimization research for Ethiopian cases that deals with multiple crops and variables. So, a quantifiable model that optimizes the total economic contribution for the selected oilseeds and other crops at a farm level in the selected Ethiopian region is needed. By economic contribution, we refer to the farmer's net income from each crop after subtracting the costs associated. Linear programming as it is one of the most widely used optimization model

techniques used in modern business is adopted for modeling purpose. According to Claassen et al (2007), ever since linear programming was introduced, it has been in wide use.

Optimization of oilseeds farming in Ethiopia is constrained by various restrictions. On the one hand are constraints of agronomic nature such as weather, crop rotation, soil nutrients and so on. On the other hand, socio-economic restrictions like labor requirements, land availability, and food securities also apply. Ethiopian farms are characterized by peasant own production, simple technology, rain fed system, low levels of modern inputs and little irrigation.(Yao, 1996). The traditional nature of Ethiopian agriculture even puts more limits on the already listed constraints.

Research Problem

Although oilseeds are widely regarded as a great business engine for Ethiopian economy, there are no or limited research on an integrated analysis of oilseed production on farms which is complemented by cereals and pulses. The Ethiopian Institute of Agriculture (EIAR) which has the biggest farm research in the country seem to give a little attention to researches on economic optimization of different agricultural settings. Tesfaye (2007), outlined the socio-economic research branch of EIAR as only focusing on methods of participatory research and technology transfer, monitoring and evaluation of technology packages with regard to adoption and impact, and contributions to policies. This is why it is difficult to find a study on economic farm optimization with multiple crops and constraints. Addressing this research gap and developing a linear optimization model for the crops could help planners as well as future researchers.

The knowledge gap has prevented policy makers, business managers and other stake holders from making well informed decisions in the past. This bottleneck also had its role in depressing the attempts to improve overall crop yields and farm incomes. Having adequate well-presented information will improve the efficiency of rural development projects and programmes (Samuel, 2001). Thus, a sound knowledge base is needed to facilitate the improvement of oilseed productivity and its economic yield along with other crops in Ethiopia.

Objective of the Study

The main objective of this study is to develop an optimization model for oilseed and other crops production at a farm level in a selected Ethiopian region. To reach this objective, the following research questions will be answered:

a) What are the key crop and oilseed types that can be grown on a typical Ethiopian crop farm at the region and should be included in the model?
b) What are the most important agronomic and socio economic restrictions in optimizing the economic yield of crops included on the farm?
c) What are the farm expenses and returns of each crop?
d) How do the restrictions and variables affect the net farm income and what is the optimum cropping plan?

e) How will different scenarios of constraints and crop combinations affect the total net farm income?

Methodology

Brief Description of the Study Area

This study is about the region of Jimma. Jimma is one of the 13 zones in Oromiya region in the southwestern part of Ethiopia. It has about 2,486, 155 people of which 5.7% are urban dwellers and 94.3% are rural dwellers. (CSA, 2007). Jimma is known for its rich coffee. Most of Jimma's landscape is midlands which constitute 67% of the land. In 2008/2009 season, the area under cultivation was 444,126 hectares with total production of 6,775,963 quintals of yield.

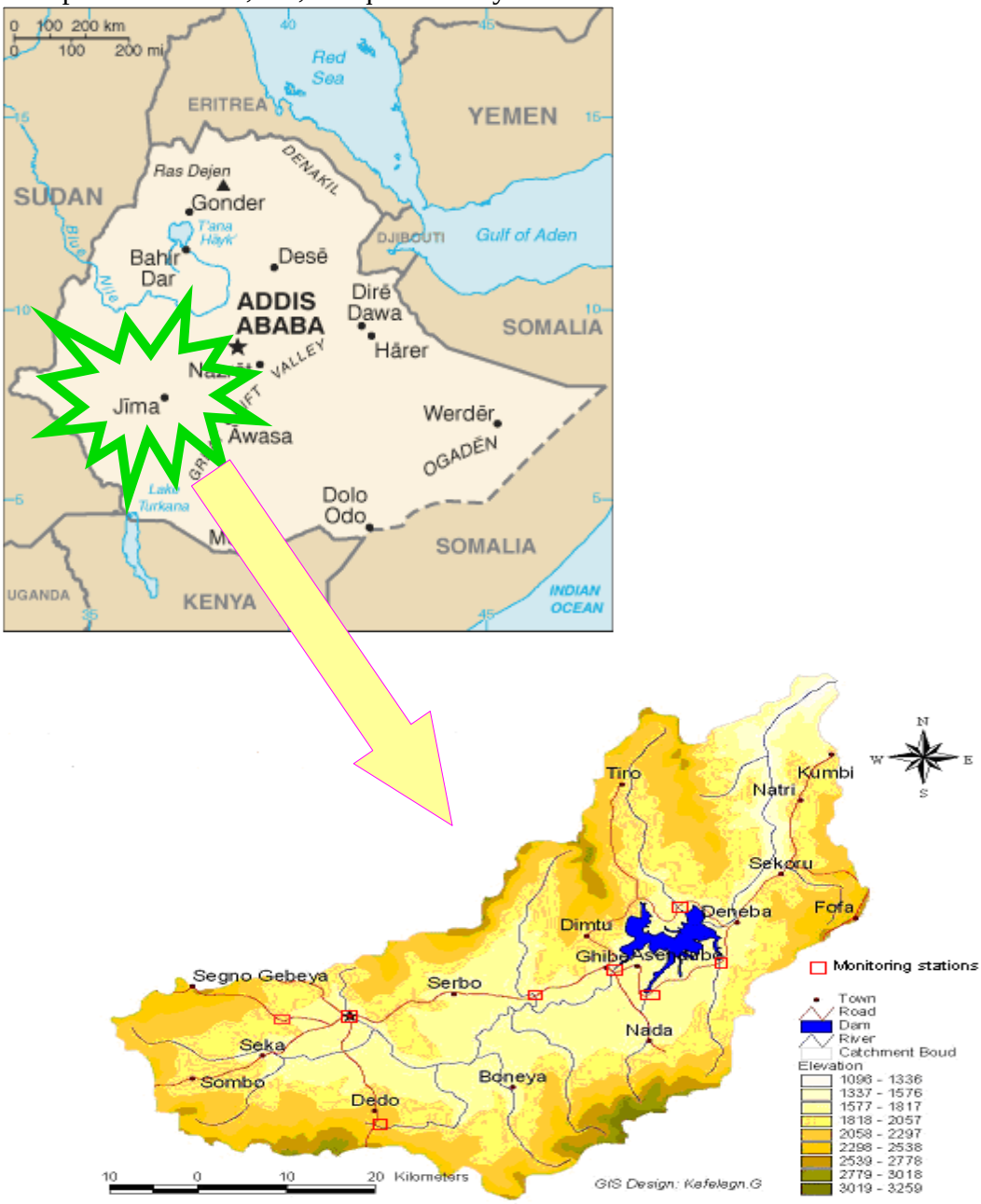

Figure 1: Location of the Study

Data Type and Data Source

This research will mainly rely on secondary data sources of both quantitative and qualitative nature. The secondary data sources include CSA data, government reports, past scientific papers, literature reviews and private researches.

The CSA data will be used to identify the key crops and oilseeds that are predominantly cultivated in Jimma region. This will help us choose the crops to be included in the model. CSA data will also provide us with general information such as average yields, rough fertilizer consumptions, and other resource requirements for the crops. Moreover, literatures depicting the general agronomic and socio economic nature of Ethiopian agriculture will be extensively used to identify the major agricultural restrictions that will be included in the farm model.

Government reports, past scientific papers on Ethiopian agricultural economics, Agricultural association reports and private works will also be part of the assessment to cross check facts and solidify findings. Additionally, current researchers on the issue will be consulted for retrieving vital data.

Data Collection Method

The research will be conducted here in the Netherlands. So, there will be no field assessment and face to face interview with farmers. Since secondary data will be used mainly, much of the data collection will be done by reviewing all the sources mentioned above. To fit the information available to the purpose of this research, some restructuring of the original data may be done.

Methods of Data Analysis

In this study, data will be analyzed using different quantitative and qualitative statistical procedures and methods. Descriptive statistical measures such as means and percentages will be used to summarize raw data available about Jimma region. This will assist in producing input data or resource consumption data for the crops in monetary terms which will be vital to compute the gross returns (margins) of the crops

Further data interpretation will be mainly assisted by mathematical programming software known as GAMS. Gross margin data and constraints data will be fed in to the software to perform actual optimization and also sensitivity analysis. Hence, the nature of the analysis is mainly quantitative. However, qualitative data will be partly analyzed on spot during data collection to fill the gaps in the quantitative data.

Report Outline

1 Introduction
1.1 Background
1.2 Research Problem
1.3 Objective of the Study
1.4 Methodology
1.4.1 Study Area
1.4.2 Data Collection Tools
1.4.3 Analytical Techniques

2 Review of Literatures
2.1 Basics of Farm Optimization: Definition and Significance
2.2 Farming in Ethiopia and the Changes
2.3 Farm Inputs in Ethiopia
2.4 Agronomic Constraints in Farm Optimization
2.5 Socio-economic Constraints in Farm Optimization

3 Model Specification and Data Interpretation
3.1 General Structure
3.2 The Objective Function
3.2.1 The Crops
3.3 Farm Condition
3.4 Constraints
3.4.1 Crop Rotation
3.4.2 Land Availability
3.4.3 Land Policies
3.4.4 Labor Availablity
3.4.5 Food Security
3.4.6 Cash Flow Requirement

4. Interpretation of the Linear Programming Results
5 Major Findings, Discussions and Conclusions

Time Table

Time / **Activity**	**July**	**August**	**September**	**October**	**November**	**December**	**January**
Proposal Writing	√						
Review of Literature	√	√	√				
Data Collection		√	√	√			
Data Analysis			√	√	√		
Model Development			√	√	√		
Model Analysis				√	√	√	
Drawing Conclusions and Recommendations						√	√

References:

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