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## Productivity Growth of Smallholder Sugarcane Farms in Kenya: A Data Envelopment Analysis (DEA) Decomposition

RICHARD MBITHI MULWA<sup>1</sup>, ERNST-AUGUST NUPPENAU<sup>2</sup>

<sup>1</sup>*Justus-Liebig-University Giessen, Project and Regional Planning, Germany*

<sup>2</sup>*Justus-Liebig-University Giessen, Institute of Agricultural Policy and Market Research, Germany*

### Abstract

Studies on Kenyan agriculture show that while production and input use have grown, productivity has stagnated. This includes the sugar sub-sector, which holds a key position in the Kenyan agricultural sector. Statistics from the Kenya Sugar Board (KSB) (2003), show declining cane yields from 1997 to 2000. It's against this background that we carried out this study in three sugar schemes in Kenya. The objective was to determine the total factor productivities among smallholder sugarcane farms between two plant-crop periods. A total sample of 95 farms was considered in our study. Mumias scheme had 41 farmers, Chemelil had 28, while west Kenya recorded 26 farms. This study uses the Malmquist Total Factor Productivity (TFP) Index. The advantage of this methodology is that it decomposes TFP into its efficiency and technological change components, and this makes it easier to identify the areas of emphasis when tackling the issue of productivity. Results show TFP values of 0.984, 0.880 and 0.982 for Mumias, Chemelil and West-Kenya schemes respectively, while the overall TFP change was 0.947. This is an indication that, for the combined schemes, TFP declined by 5.3% between the two periods. Depending on the scheme however, the decline could be attributed to either technological or efficiency regress. In the decomposed form, the efficiency change in Mumias was 1.011 while the technological change was 0.973. Chemelil had an efficiency change of 0.947 and a technological change of 0.929, while west Kenya recorded efficiency and technological changes of 0.962 and 0.993 respectively. These measures give an indication of the target areas of policy intervention in each scheme, but in the overall, sugarcane farming in Kenya is faced by both efficiency and technological problems.

**Keywords:** Efficiency change, Malmquist TFP index, technological change, total factor productivity