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## Cost benefit analysis of agroecological transition: A case of mango value chain in Kenya

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### Abstract

Agroecology has been highlighted as a sustainable approach that could support food system transformation in many low- and middle-income countries. Food system actors adopt agroecological (AE) principles to improve economic, environmental and social benefits within the food system. However, there is limited evidence on the cost and benefits (CBs) associated with AE transition. The goal of this study was to assess the CBs associated with AE transition in the mango value chain (VC) in Makueni County, Kenya. Mango is an important source of income and livelihood for many food system actors within the County. A co-design workshop was conducted to identify business models and innovations important for the AE transition. Two models were identified. First, the public business model which involves farmers selling mangoes to public processors through cooperatives. Innovations identified for AE transition were intercropping, activities related to reduced post-harvest losses, and the use of organic inputs. Second, the private business model which consists of individual farmers selling their mangoes to private processing companies. Innovations identified were use of organic inputs, intercropping, and expansion of business through enterprise diversification. A cost and benefit analysis (CBA) was conducted on both business models, covering farm and business levels. Net present value (NPV), internal rate of return (IRR) and Benefit-Cost Ratio (BCR) were used to assess the economic CBs, while content analysis was used to assess the social and environmental CBs in the two business models. Preliminary findings show that benefits associated with AE transition are significantly higher than the costs at both farm and business levels. At farm level the NPV ranged between US\$300 and US\$400, a positive BCR ( $>3$ ) with a payback period of two years while the IRR ranged between 100 % and 250 %. This means the AE transition at the farm level is profitable. At business level the NPV were above US\$19,095, with a positive IRR of less than 115 %, a BCR of  $>1$  and a payback period of three years, implying that the business side will make an economic profit with AE transition. The manuscript provides additional findings on the social and environmental benefits, and overall study recommendations.

**Keywords:** Africa, agroecology, cost benefit analysis, developing countries