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### **PARTICIPATORY TECHNOLOGY DEVELOPMENT IN SUPPORT OF ARTISANAL PALM OIL PRODUCTION IN GHANA**

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The research started off with exploratory and scoping which showed that Ghana's industrial (good) quality crude palm oil (CPO) production have stagnated over the last 12 years, while domestic consumption continues to increase with a growth rate of 2.8%. Import for the commodity is estimated to increase to over 125,000 metric tons (MT) by 2025. There is also a growing West African market which demands close to 1 million MT a year. Artisanal oil palm processing is a source of income for many females in rural Ghana. This enterprise can produce about 80% of crude palm oil (MOFA, 2011). Ghana thus has the potential to meet the growing market interest both domestically and internationally. However, it was established from a diagnostic study that the artisanal enterprise is faced with a myriad of multi-faceted constraints, particularly the production of poor quality palm oil of high free fatty acid levels which makes access to such remunerative markets difficult. This paper investigates how participatory technology development within the context of the Convergence of Science-Strengthening Innovation Systems (CoS-SIS) programme can be explored to improve the quality of palm oil. The main focus is to study the interface of social, technical and institutional aspects of the identified constraints through a transdisciplinary research. The local knowledge of artisanal mill practitioners was first observed and learned through ethnographic methods to understand the details of processing practices, actors' interfaces and engagements in social networks. These social insights from the practitioners provided a sound basis or hypothesis for a joint experimentation activity. It was found the processing practice of storing fruits for several days lead to production of poor quality palm oil. A joint experimentation group planned and implemented processing activities for four different storage periods (3, 7, 14 and 21 days) to learn about the variation of fruit storage after harvesting on palm oil yield and quality. This was done alongside a researcher-managed experiment on the same issue and a profitability analysis to ascertain whether it is profitable for processors to improve the quality or continue with the former processing practice and produce poorer quality palm oil. A local stakeholder's platform was formed to help various stakeholders (scientists, extensionists, mill practitioners, farmers etc.) to put their perspectives, knowledge and skills together to address. The joint experimentation and discussion of its outcomes at the stakeholders' platform were useful in enhancing learning, leading to a reduction in fruit storage period as a processing practice and thus lowering free fatty acid level. In addition, higher-level stakeholders at both the district and national levels were engaged with as an innovation platform (Concerted Innovation Group), and linked up to support the local struggle of learning to produce good quality of palm oil.

It is concluded that different models of information sharing and interventions are necessary and complement each other to address different levels of constraints in the artisanal oil palm processing. The multi-scale stakeholder approach used in the research ensured the flow of knowledge at different levels, for instance between artisanal mill practitioners; within scientific or extension community; and also between the practitioners, scientists and extension service. The artisanal oil palm processing enterprise is able to innovate if all relevant stakeholders (are willing to) learn to overcome constraints and create opportunities, and also change institutions which negatively affect the enterprise.

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