

# Chapter XV: SWOT analysis of sweet sorghum ethanol value chain

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## I. Introduction

In recent years there is considerable debate on alternative feedstocks for bioethanol production to meet the mandated blending requirements with fossil fuels (petrol). Worldwide, a number of feedstocks ranging from cereal grains to sugarcane juice to molasses (obtained from conversion of cane juice to sugar) are commonly being used. However, these feedstocks are being critically examined for their role in increasing food costs and compromising on food security. Sweet sorghum has emerged as an alternative crop whose stalks are converted into juice for ethanol production. Two models for conversion of sweet sorghum into ethanol have been pilot tested, i.e., a centralized model (stalks supplied directly to the distillery for ethanol production) and a decentralized model where the syrup produced at village level is supplied to distillery for ethanol production. A number of issues and strengths in using sweet sorghum as an alternative feedstock have emerged.

To get a better handle on the conversion of sweet sorghum to syrup and subsequently to ethanol at the distillery, a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is carried out for Sweet Sorghum to Ethanol Value Chain under the Decentralized Crushing Unit (DCU) model established at Ibrahimbad village, Medak district, Andhra Pradesh, India in 2008. Such an analysis will be useful for researchers, policymakers and also all the stakeholders in the value chain. A summary of the major strengths, weaknesses, threats and opportunities of the DCU pertaining to the function of the entire sweet sorghum bioethanol value chain is provided in this chapter.

## II. The SWOT analysis

A SWOT analysis is a strategic planning tool used to evaluate the Strengths, Weaknesses, Opportunities and Threats involved in a project or business venture. It involves specifying the objective of the project, analyzing the advantages and disadvantages of the project and identifying the internal and external factors that help to achieve the project objective.

The general matrix used for SWOT analysis is

Strengths	Weaknesses
Opportunities	Threats

The schematic view of the DCU has already been presented in the earlier chapters. The SWOT is elaborated in terms of brief statements on the strengths, weaknesses, opportunities and threats of the decentralized production system of ethanol production. These statements shall give a quick overview about advantages and disadvantages of DCU for ethanol production from syrup.

Strengths	<ul style="list-style-type: none"> <li>• Reduces the volume of feedstock transport over a long distance.</li> <li>• Reduces the delay in crushing of sweet sorghum stalks as a 24-hour delay in crushing will reduce juice yield by 6%.</li> <li>• Crushing of sweet sorghum at DCU provides bagasse as by-products can be used for livestock feed by the farmers.</li> <li>• Additional employment generation due to syrup making during lean periods of agricultural operations.</li> <li>• Additional employment generated provides additional income for the participating households.</li> <li>• Provides opportunities for smallholder farmers to become micro-level entrepreneurs.</li> <li>• The linkages/partnerships established under DCU are mutually beneficial to Farmers, DCU and the Industry.</li> <li>• Farmers' collective action in processing sweet sorghum to syrup strengthens the community as a whole.</li> <li>• Provides scope for value addition for various products (bagasse for livestock feed, for vermicomposting and for paper making etc). The syrup is also in demand by the food industry as a sweetener.</li> <li>• Processing of sweet sorghum to syrup is environment-friendly as it does not produce any pollutants.</li> <li>• The grain can be harvested and used as food before supplying the stalks to DCU.</li> <li>• Syrup can be stored for 24 months or more before conversion into ethanol.</li> </ul>
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Weaknesses	<ul style="list-style-type: none"> <li>• Extensive co-ordination and planning requirements in operations and management of DCU/supply chain management . (For example, there is a strict time frame to be followed for staggered sowing, harvesting at the right time, transportation of stalks etc.).</li> <li>• Knowledge dissemination (by way of initial training and extension) is expensive.</li> <li>• Non-availability of specific crushing equipment to crush sweet sorghum stalks.</li> <li>• Lack of management skills to handle DCU operations without assistance of partners such as ICRISAT, NGO or ABI.</li> <li>• High cost of establishment of DCU; high processing and operational costs.</li> <li>• Inability of the DCU to supply large quantity of syrup as feedstock to process into ethanol.</li> <li>• Appropriate policy support not in place to support production and processing of sweet sorghum to syrup and ethanol.</li> <li>• Low bargaining power of the farmers in pricing of syrup.</li> </ul>
Opportunities	<ul style="list-style-type: none"> <li>• Provides opportunity to mechanize and standardize most of the processing activities.</li> <li>• Provides opportunity for value addition for various by-products available for alternate markets.</li> <li>• Scope for promoting the DCU as an small-scale agro-enterprise in rural areas.</li> <li>• Valuation of environmental benefits from economic and sustainability perspective.</li> <li>• Provides opportunities for smallholder farmers at village to become micro-level entrepreneurs through establishment and management of decentralized unit.</li> <li>• Meet the mandated blending requirement of the government.</li> <li>• Research activities for development for genotypes with high Brix content stalk yield.</li> </ul>

Threats	<ul style="list-style-type: none"> <li>• High dependence of DCU on distillery leading to uncertain market and uneconomic price.</li> <li>• High cost of syrup production acts as threat to the viability of DCU.</li> <li>• Sustainability of DCU is an issue without support from ICRISAT/partners.</li> <li>• There has to be continuous technical backstopping to ensure sustainability of the DCU.</li> <li>• As majority of the processing activities are labor-oriented, labor scarcity might affect syrup production.</li> <li>• Non-monetary benefits of the elected members of the farmers' association may impact the functioning of the association per se.</li> <li>• Lack of government policy support for establishment of DCU.</li> </ul>
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