Expanded Markets for Cassava: Industrial Options

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Introduction
The project on expanded markets for cassava, derives from needs assessment activities carried out by Ministry of Food and Agriculture and the Natural Resources Institute. In 13 out of 16 Districts in Brong Ahafo Region, farmers gave high level of priority to the issue of expanded markets for cassava. Farmers highlighted the urgent need for a reliable and remunerative market for excess supplies of cassava.

The Crop Post-Harvest Programme of the Department for International Development initiated a project to address this need, and to encourage development of local products to reduce Ghana’s reliance on imported materials. The project involves 6 collaborating organisations from Ghana and the United Kingdom (Table 1). In addition three farmers groups and seven industries have already been involved in project activities.

Table 1. Summary of non-commercial partners on the CPHP project on expanded markets for cassava in Ghana.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Area of Interest</th>
<th>Contact Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Research Institute</td>
<td>Sugar syrups / bakery products</td>
<td>Mr Nanam Dziedzoave</td>
</tr>
<tr>
<td>Forestry Research Institute of Ghana</td>
<td>Plywood and paperboard adhesives</td>
<td>Dr N. Darkwa</td>
</tr>
<tr>
<td>Ministry of Food and Agriculture (Brong Ahafo)</td>
<td>Adaptive research and technology transfer to rural processors</td>
<td>Mr L. Krampa</td>
</tr>
<tr>
<td>University of Ghana, Department of Nutrition and Food Science</td>
<td>Industrial alcohol’s and sugar syrups</td>
<td>Prof G. S. Ayernor</td>
</tr>
<tr>
<td>National Board for Small-Scale Industries</td>
<td>Dissemination and support for industry (secondary processors and end-users)</td>
<td>Mr E. Boateng</td>
</tr>
<tr>
<td>Natural Resources Institute</td>
<td>Support for all research areas and co-ordination</td>
<td>Dr A Graffham (Project Co-Ordinator)</td>
</tr>
</tbody>
</table>
**Industrial potential for cassava: – starch versus flour**

Persons wishing to encourage development of cassava as an industrial commodity frequently identify starch as the obvious choice of product. Starch is a high value product, with many industrial applications, and several countries have developed large and highly successful cassava starch industries (Thailand, India and Brazil). However, large-scale production of cassava starch is a very demanding activity that requires the following criteria to be fulfilled before attempting manufacture:

- Constant supplies of large amounts of high quality cassava, with associated farming practices;
- Excellent transport infrastructure to ensure that cassava can be processed within 12 hours of harvest;
- Access to large volume of high quality water;
- Access to reliable supplies of electricity in rural areas.
- High capital investment;
- Access to skilled labour;
- Understanding of international market for starch.

High-grade cassava flour is an attractive alternative to cassava starch that can form the starting point for a cassava-based industry that may develop into starch production at a later date. Production is much less capital intensive, less quality sensitive (as compared to starch) and requires a lower level of inputs for success. High-grade cassava flour has the potential for use as an alternative to starch and other imported materials in a range of industries.

A summary of the most likely industrial markets for high-grade cassava flour is given in Table 2. The various options are listed according to the relative ease of access to each market. The plywood and paperboard industries are relatively simple using either high-grade cassava flour directly or adhesives containing blends of flour with one or more readily available chemicals. Accessing markets for sugar syrups and industrial alcohol requires a higher level of technical expertise and capital investment for success.
Table 2. Industrial options for high-grade cassava flour.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Current Product</th>
<th>Locally produced cassava-based alternative</th>
<th>Quality requirements</th>
<th>Market potential (Tonnes of fresh cassava)</th>
</tr>
</thead>
<tbody>
<tr>
<td>plywood</td>
<td>Imported wheat flour</td>
<td>High-grade cassava flour</td>
<td>High – Finely milled (0.25mm), white flour, low fibre, not fermented, with high paste viscosity and stability.</td>
<td>17,000-34,000 Tonnes</td>
</tr>
<tr>
<td>paperboard</td>
<td>Imported glue, based on maize starch</td>
<td>Adhesive made from high-grade cassava flour</td>
<td>High – As for plywood.</td>
<td>21,000 Tonnes</td>
</tr>
<tr>
<td>textiles</td>
<td>Imported and locally produced maize starch</td>
<td>High-grade cassava flour</td>
<td>High – Finely milled (0.25mm), white flour, low fibre, no odour or taints, and not fermented, with high paste viscosity and stability.</td>
<td>17,000 Tonnes</td>
</tr>
<tr>
<td>sugar syrups</td>
<td>Mostly imported sugars</td>
<td>High-grade cassava flour converted into sugar syrup using plant enzymes</td>
<td>High – As for textiles, but paste viscosity and stability are not important.</td>
<td>251,000 Tonnes</td>
</tr>
<tr>
<td>industrial alcohol</td>
<td>Mostly imported, with small amount of local production.</td>
<td>High-grade cassava flour converted to sugar, then fermented and distilled to produce 96% industrial ethyl alcohol</td>
<td>High – As for sugar syrups.</td>
<td>56,000 Tonnes</td>
</tr>
<tr>
<td>bakery products</td>
<td>Imported wheat flour</td>
<td>High-grade cassava flour</td>
<td>High – Similar to textiles.</td>
<td>90,000 Tonnes*</td>
</tr>
</tbody>
</table>

**Total market requirement (Tonnes fresh cassava):** 452,000 – 469,000 Tonnes

* Assuming a 10% replacement of imported wheat flour with high-grade cassava flour.
Production of high-grade cassava flour
This section provides a summary of factors that are necessary for production of high-grade cassava flour. It is important to emphasise at this point, that high-grade cassava flour is not kokonte flour. High quality kokonte is produced by a different process altogether. Detailed information on production options for both rural and centralised processing can be obtained by contacting the following persons:

Mr Nanam Dziedzoave or Mr Cletus Gyato
CPHP Expanded Markets for Cassava
Food Research Institute
PO Box M20
Accra, Ghana

The most important factors for manufacture of high-grade cassava flour are:

1. Always use high quality cassava (10-12 months old at time of harvest), and make sure processing carried out within 1 day of harvest. Cassava of this type will have optimum starch yield, and minimum levels of fibre and water. Most varieties can be used, but high moisture varieties such as Agbelima duade should be avoided.

2. Always peel and wash cassava roots before processing.

3. Cassava may be chipped or grated but chips and grits must be small enough to allow drying to be completed within 1 day (sun drying). Rapid drying under clean conditions is essential for maintaining quality.

4. The dried product should be milled (hammer or disc attrition mill) and screened through a 0.25mm metal mesh (obtainable from Food Research Institute) to produce a finely milled product containing minimum fibre levels. Plastic netting and mosquito mesh will not produce products of the required quality, as so must not be used. The use of 0.25mm metal mesh is essential for all of the industrial products mentioned in this paper.

The importance of quality
Discussions with representatives of the plywood and paperboard industries in Ghana, have highlighted several issues that are considered as essential for successful marketing of cassava-based products for industrial use. These are:

- **Manufacture of products to meet the required quality specifications** - Before starting production of cassava-based product, it very important to determine the customer’s requirements on quality, and for producer and user to agree a standard for quality of the product.

- **Reliability in maintaining quality** - When a quality specification has been agreed, it must be maintained at all times. The use of adulterants and short cuts to reduce costs and process times must be avoided.

- **Reliability of supply (quantity)** - Processors must never promise more than they can produce by the agreed delivery date, as the end user will be planning his production on the basis of having the necessary quantities of raw materials.

- **Timeliness of delivery** - Realistic delivery dates are a must for commercial success.

- **Price competitiveness** - Industrial users want a local product that is cheaper than the imported alternative. However, reduction in price must not be achieved at the expense of quality.

It is vitally important for anyone wishing to market cassava-based products to industry to keep these criteria in mind at all times. Many industries expressed a willingness to be tolerant of
the manufacturers difficulties, as long as they were kept fully informed, but were not happy with past experiences of producers of cassava-based products who were found to be unreliable on quality quantity and timeliness of delivery.

Development of market linkages
This project has demonstrated that rural processors can produce high-grade cassava chips/grits and flour to meet the specifications of industrial users. It is also clear that demand for these products and materials derived from them, exists in the urban industrial sector. However, there is currently no link between rural processor and industrial user. Furthermore, some of the products require specialised secondary processing (sugar syrup production, alcohol manufacture, and adhesive formulation) that cannot be done in the village. There is clearly a need for entrepreneurs who can form the necessary linkages, provide financial support for rural processors and carry out secondary processing operations.

The criteria used for identification of potential entrepreneurs for the role of market linkage and secondary processor, include:

♦ Access to capital;
♦ Access to processing facilities and commercial transport;
♦ Relevant manufacturing experience;
♦ Proven business record (success over 10 years or more);
♦ Proven record on quality;
♦ Understanding of the market system and issues involved;
♦ Willingness to support farmers and primary processors for mutual gain.

Project successes (as of June 2000)
Success in research is of vital importance for achieving technical objectives. However, for expanded markets, success in the field is of even greater significance. The following is a summary of successful field activities:

• In Watro village (Atebubu District) a group of 11 processors have started to produce high-grade cassava flour, for use in bakery products. Four bakers in Atebubu have started to incorporate high-grade cassava flour into their products. In bread the level of substitution is 25%, in boofrots and sweetbads 60% of wheat flour is replaced with cassava flour, and in cake, cassava flour has completely replaced wheat flour. Demand for high-grade cassava flour is increasing, and requests have been received to extend training to bakers in 4 towns around Atebubu.

• Cassava flour has been successfully tested in two plywood factories in Kumasi, as a partial substitute (45% substitution) for imported wheat flour in the formulation of urea formaldehyde glue mixes. Factories have expressed the desire to purchase cassava flour for use as a glue extender. Farmers groups in Atebubu District produced most of the flour used in these trials.

• A locally manufactured paperboard adhesive consisting of high-grade cassava flour mixed with a small amount of soluble borax (welding flux), has been successfully tested as a complete substitute (100% replacement) for imported adhesive. The locally produced product was demonstrated to be of the same high quality as the imported material. Several paperboard factories have expressed interest in purchasing high quality locally made adhesive, and two entrepreneurs have indicated that they would be interested in manufacturing the product.
**Current activities**  
Project activities for the period between July 2000 and June 2001, include:

- **Continued adaptive and strategic research activities** – Research is continuing on aspects of conversion of cassava flour to sugar syrups and industrial alcohol, and development of improved adhesive formulations for plywood and paperboard.

- Awareness days for industry and policy makers – A series of short seminars (scheduled for September-October 2000) will be held in Accra, Tema, Sekondi/Takoradi and Kumasi, to raise awareness of the practical potential of cassava-based products as substitutes for imported materials in industrial applications. Representatives of local industries, and those involved in development and implementation of policy will be invited.

- **Training for producers of high-grade cassava chips and flour** – Training sessions in production of high-quality cassava chips and flour, are planned (August-September 2000) for farmers groups in two villages (Kokofo and Watro) in Atebubu District, so as to expand the production base to meet existing and anticipated demand for high-grade flour from bakers in Atebubu District.

- **Training for bakers in use of cassava flour** – Training sessions are planned for professional bakers in Atebubu, Amanten, Kwame-Danso and Yeji (September-October 2000). A baker from Atebubu is helping to prepare a manual to assist bakers in adoption of cassava flour. This activity has been initiated in response to local demand.

- **Formation of links with secondary processors** – Discussions are underway with several entrepreneurs with a view to encouraging formation of the necessary links between rural processor and urban user of cassava-based products. Business plans and feasibility studies are being prepared (December 2000) to enable entrepreneurs to make value judgements on the advisability of investing in expanded markets for cassava.

For more information on the expanded markets project in Brong Ahafo Region, please contact:

Mr Lawrence Krampa  
Project Manager (Brong Ahafo)  
Ministry of Food and Agriculture  
PO Box 86  
Sunyani, Ghana.

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Composition of audience:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Chief Executives</td>
<td>6</td>
</tr>
<tr>
<td>Agricultural Extension Officers</td>
<td>30</td>
</tr>
<tr>
<td>Research Personnel (CSIR)</td>
<td>8</td>
</tr>
<tr>
<td>Press</td>
<td>7</td>
</tr>
<tr>
<td>Farmers (District Representatives)</td>
<td>14</td>
</tr>
<tr>
<td>Representatives of secondary schools</td>
<td>8</td>
</tr>
<tr>
<td>Restaurant owners (GTCA)</td>
<td>3</td>
</tr>
<tr>
<td>Vehicle Drivers</td>
<td>6</td>
</tr>
<tr>
<td>Natural Resources Institute</td>
<td>2</td>
</tr>
<tr>
<td>GTZ</td>
<td>1</td>
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<td><strong>Total:</strong></td>
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