



Unlocking Uganda's Maize Potential Through Value-Addition and Product Diversification

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Introduction: Maize as a Global & Ugandan Commodity

Maize is a globally significant agricultural commodity.

Vital to Uganda's Economy: The most important cereal crop in Uganda and Sub-Saharan Africa.

It is a key source of income for millions of smallholder farmers.

Uganda's Production Statistics: 8th largest producer in Africa, 3rd in East Africa.

Production: ~5 million metric tons in 2023, and ~55% of all agricultural households in Uganda cultivate maize.

Untapped Potential: Globally, maize can be processed into over 4,200 products, highlighting a major opportunity for Uganda.

Why the Maize Value Chain?

Developing the maize value chain is a critical engine for progress.

Supports National Development Plan IV (NDP IV):

- Enhances Production and Value Addition.
- Supports Private Sector-Led Growth.
- Promotes Export and Import Substitution.

Catalyst for Sustainable Development Goals (SDGs):

- SDG 1: No Poverty
- SDG 2: Zero Hunger
- SDG 8: Decent Work and Economic Growth
- SDG 9: Industry, Innovation, and Infrastructure



Maize Types and Uses in Uganda

Maize Type/Variety	Key Characteristics	Primary Use in Uganda
White Maize	Preferred taste, mills into white flour	Human Food: Posho, porridge, blended flours
Yellow Maize	Contains beta-carotene, slightly sweeter	Animal Feed: Primarily for poultry; some brewing
Quality Protein Maize (QPM)	White maize, high in lysine & tryptophan	Nutrition: Porridge for children & vulnerable groups
Commercial Hybrids	Very high yield, large cobs, requires inputs	Commercial Milling: Branded flour and industrial animal feed
Local Landraces (OPVs)	Hardy, resilient, lower yield, seeds can be saved	Subsistence: Household food security (posho/porridge)
Green Maize (Immature)	Soft, sweet kernels (any variety harvested early)	Street Food: Roasted or boiled on the cob

Key Maize Types and Their Primary Uses in the USA

Type of Maize	Description	Primary Uses
Field Corn (Dent Corn)	Most widely grown (99% of U.S. production), harvested dry, kernels have a dent.	Livestock feed, ethanol, plastics, cornstarch, refined food ingredients (10% of field corn).
Sweet Corn	Harvested immature to retain sweetness and juiciness (1% of U.S. production).	Primarily direct human consumption (e.g., corn on the cob).
White Corn	Specialty corn with higher starch levels.	Corn chips, tortillas, other popular food products.
Specialty Corns	High-starch, high-oil, waxy, high-lysine varieties.	Engineered for specific industrial or nutritional applications.
Flint Corn / Popcorn	Hard shell, soft moist center; often colorful and used for decoration. Popcorn is a type of flint corn that puffs when heated.	Decoration, popcorn (direct human consumption).

Maize Processing - Unlocking Product Streams



Industrial processing is key to transforming raw maize into value-added products.

Proper postharvest handling, including drying, sorting, cleaning, grading, and storage, is the first level of value addition, which, if not done correctly, results in a loss in quality and quantity, hence value.

Primary Global Methods:

- Dry Milling
- Wet Milling, and
- Alkaline Cooking

Current State in Uganda: Maize milling and starch production are key drivers of demand.

Local milling companies specialise in producing high-grade flour and bran.

Processing is crucial for food availability and economic development.

Method 1: Dry Milling in Uganda

- A simpler grinding procedure, primarily yielding flour, cornmeal, and grits.
- Core Outputs:** Maize flour (posho) and porridges - staple food products in Uganda
- Additional Products:** Maize bran and feed mixtures are significant by-products.
- Ugandan Application:** These products are sold to dealers, stockists, and directly to consumers in both rural and urban sectors.



Method 2: Wet Milling - Future Potential

Process: A multi-step process separating maize into its basic components of starch, oil, protein, fiber, and steep liquor.

Key Outputs: Starch, corn oil, gluten, syrups, ethanol, and more.

Economic Driver: Offers maximum value extraction and diverse revenue streams.

Ugandan Opportunity: Represents a significant opportunity to diversify into high-value products beyond staple foods, aligning with industrialisation goals.



Corn Oil



Fiber



Gluten Meal



Starch

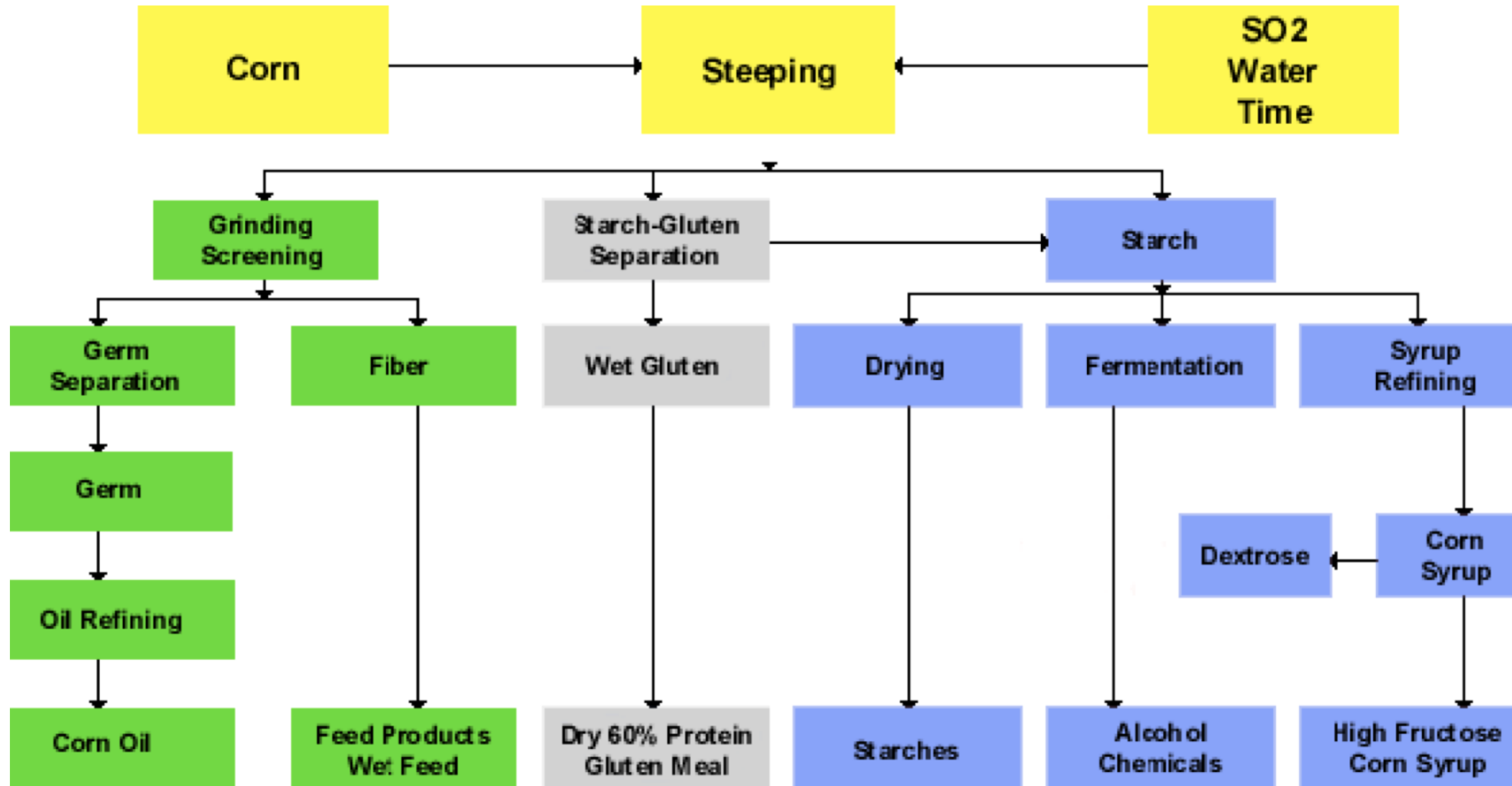


Alcohol



Sweetener

The Maize Wet Milling Process and Its Key Product Outputs



Source: Minnesota Corn Processors, LLC: <http://www.mcp.net/info/wetmill.html>

Method 3: Alkaline Cooking (Nixtamalization)

TRADITIONAL NIXTAMALIZATION PROCESS



A traditional Central American maize processing method for producing *masa*, the dough for corn tortillas, tortilla chips, and corn chips.

Ugandan Opportunity: While not widely industrialized locally, this method presents a potential area to diversify food products for both local and export markets.

Possible Products from Alkaline Cooking (Nixtamalization)



CORN TORTILLAS
YELLOW CORN



CORN TORTILLAS
CASERAS WHITE CORN



Corn tortillas



Corn chips.



Tortilla chips

Source: www.guerrerotortillas.com

Possible Products from Alkaline Cooking (Nixtamalization)



Source: www.masienda.com

Value Addition: Food Products & Ingredients

•**Direct Food Products:** Staples like posho, Porridges, and mpegyere (maize-beans mix) are central to Ugandan cuisine.

•Opportunity in breakfast cereals and snacks (cornflakes, popcorn, puffs).

•**Processed Food Ingredients:** Corn Syrups (sweeteners, thickeners).

•Corn Starch (thickener, anticaking agent).

•Corn Oil (healthy cooking oil).

•**By-product Valorisation:** Defatted maize germ flour, fiber gum, xylitol, and vanillin offer new product opportunities.

These represent significant opportunities for new product development in Uganda.



Value Addition: Beverages- Existing and Potential Products

- **Fermented Beverages**, e.g. Corn Beer, Traditional African Beers (Chibuku, Kwete)
- **Distilled Spirits**, e.g. Corn Whiskey, Vodka, Bourbon Whiskey
- **Corn-based soft drinks**, e.g. corn shakes, corn milk, and sodas



Value Addition: Animal Feed Formulations

•Maize is the cornerstone of animal nutrition globally and Uganda in particular.

•It is a highly valued energy source for all livestock, including ruminants, pigs, poultry, rabbits, and fish, due to its high starch and moderate oil content.

By-products of Maize Processing

- **Maize Bran:** A key by-product of maize milling in Uganda, widely utilized in animal feed formulations. It is one of the most utilised agro-industrial by-products.
- **Maize Stover:** Widely available crop residue utilised for animal nutrition, with usage starting to pick up in Uganda recently

Challenges & Opportunities:

- The high cost of maize bran (e.g., 1,500 Uganda Shillings per kg) significantly impacts over 60% of Ugandans deriving their livelihood from livestock.
- Maize's high susceptibility to mycotoxins (e.g., aflatoxins) is a significant concern, exacerbated by poor post-harvest handling and storage facilities in Uganda, leading to health risks and reduced market value.

Addressing these challenges through Technology Transfer and R&D to improve storage and processing is crucial.



The Industrial Innovation Frontier

Beyond food and feed, maize is a cornerstone of the global bio-economy. It is a renewable feedstock for biofuels, biodegradable plastics, and essential chemicals, offering Uganda a pathway to sustainable industrial development.

Biofuels: Ethanol Production

- Industrial applications of maize, including ethanol production, can drive commercial demand for maize grain in Uganda. This offers a renewable fuel source and co-products like distillers grains for livestock.

Bioplastics and Sustainable Materials

- The potential for maize-derived bioplastics (e.g., Polylactic Acid - PLA, Polyhydroxyalkanoates - PHA) offers a renewable alternative to fossil-based materials, aligning with Uganda's sustainability goals and industrialization drive.
- Applications include automotive parts, packaging, and consumer electronics.

Chemical, Pharmaceutical, and Other Industrial Products

- Maize derivatives are used in a vast array of chemical, pharmaceutical, and other industrial applications (e.g., adhesives, detergents, paints, antibiotics).

The re-valorization of maize by-products into high-value bioactives (e.g., maize germ oil, ferulic acid, xylitol) presents opportunities for diversified revenue streams and advanced manufacturing in Uganda.



Strategic Recommendations for Action

To unlock this potential, a concerted effort is required. We propose the following strategic actions for the Ministry of Finance Think Tank to consider.

Incentivise Investment in Processing: Provide tax breaks, grants, and access to low-cost financing for companies establishing or scaling up wet and dry milling facilities, particularly in key maize-growing regions.

Develop Quality Standards & Control: Establish and enforce national standards for maize quality, focusing on moisture content and mitigating mycotoxin (aflatoxin) contamination to ensure products are safe for consumption and competitive for export.

Fund R&D for Maize and Maize Value Addition: Support research at institutions such as Universities to develop innovative uses for maize and maize by-products, from human food and animal feed supplements to high-value pharmaceutical and cosmetic ingredients. This should include developing special maize varieties for industrial applications.

The Core Proposal: A Research Chair in Maize Value Addition



A Long-Term R&D Model to Transform the Maize Industry In Uganda

To unlock the full economic potential of Uganda's primary cereal crop, transforming it from a staple commodity into a key driver of industrial growth and sustainable development, we propose the establishment of a dedicated Research Chair, modeled on the prestigious O.R. Tambo Africa Research Chairs Initiative, to serve as a national hub for innovation and excellence.

The Key Responsibilities of the Chair

- Lead cutting-edge research on high-value products (starch, biofuels, bioplastics, pharmaceuticals).
- Develop cost-effective processing technologies for SMEs.
- Train a new generation of Ugandan Master's and PhD specialists.
- Forge strong, demand-driven partnerships between researchers, farmers, and industry.

Strategic Recommendations for Action (cont)

Public Private Partnerships (PPPs): Facilitate partnerships between the government, private investors, and development partners to fund large-scale industrial projects like ethanol plants and bioplastic manufacturing facilities.

Strengthen Farmer Cooperatives: Empower farmer groups to improve post-harvest handling, access better storage facilities (silos), and aggregate their produce to negotiate better prices with large-scale processors.

Build Export Market Linkages: Actively support Ugandan companies in accessing regional (EAC) and international markets for value-added maize products through trade missions, export promotion, and certification support.

Thank you for listening

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