



FOOD RESEARCH INSTITUTE

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AN ASSESSMENT OF THE MARKET POTENTIAL FOR CASSAVA-BASED INDUSTRIAL PRODUCTS

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EXECUTIVE SUMMARY

In order to make a rapid assessment of existing industrial markets for starch/flour-based products in Ghana and to assess the market potential for cassava-based products replacing the existing materials, a combination of a formal survey of 27 industries in different product sectors, and the review of secondary data was undertaken. The results indicated that the cassava-based products for which there is industrial potential are, high quality cassava flour, cassava starch, modified cassava flour/starch, cassava-derived industrial alcohol, and cassava chips or pellets. These products are expected to replace imported alternatives in the plywood, pharmaceutical, textile, confectionery and livestock feed industry. Time and financial limitations did not allow the stratification of the markets with respect the bread, biscuits, snacks, paper, medical, beverage and other processed food industry. The information obtained however was enough to give an idea of what the potential market is. The theoretical market potential for fresh cassava is over 297,000 tons per annum. The estimated specific requirements for each cassava-based product is about 22,536 tons for cassava flour, 221 tons for cassava starch , 190 tons for modified cassava flour/starch, 9580 tons for cassava-derived industrial alcohol, 692 tons of cassava-derived glucose syrup, and 1,782 tons for cassava chips/pellets. The information provided would be useful in targeting marketable products to develop from cassava as well the relevant markets to which these products can be targeted.

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INTRODUCTION

Ghana's economy is rapidly growing and there is the need to maximize the use of agricultural produce that have industrial potential and can serve as import substitution products. Apart from saving foreign exchange the concept would also generate employment and income for both rural and urban dwellers and contribute significantly to the reduction of poverty levels in the country. Cassava is one such crop that has potential as a raw material for several agro-industrial products such as flours, animal feed, starch, glucose syrups, cold water starch, adhesives, and industrial alcohols which find useful applications in the bakery, confectionery, plywood, paperboard, livestock and beverages industry. A previous study conducted by Grafham et al, (1998) assessed the potential markets for these products as a basis for promoting the development of products that would meet industrial demands. There is however the need to update the information provided by that assessment in order to establish whether any changes have occurred within the period that can impact negatively or positively on the concept of promoting cassava as an industrial commodity. The objective of this study therefore was to make a rapid assessment of existing industrial markets for starch/flour-based products in Ghana and to assess the market potential for cassava-based products replacing the existing materials.

METHODOLOGY

A combination of a formal survey and the use of secondary data was employed in carrying out the assessment. Secondary data collection focused mainly on an assessment of the import statistics of the existing potentially replaceable industrial products like wheat flour and its equivalents, alcohols, starches, glucose syrups, etc., with the objective of establishing product types and quantities used countrywide and annually. The formal survey involved the use of structured interviews with responsible officers of key firms in the targeted industries. The questionnaire used is as shown in Appendix I. The category of industries selected for interviewing included the plywood, the confectionery, the alcoholic beverages, the pharmaceutical and the livestock industry. The research team was made up of five researchers from three organizations [namely the Food Research Institute (FRI), the Forestry Research Institute of Ghana (FORIG) and the Brong Ahafo

directorate of the Ministry of Food and Agriculture (MOFA-BA)] divided into two sub-teams comprising 2 and 3 members each respectively. Respondents were contacted at their places of work. Whilst majority of the interviewees agreed to being interviewed a few preferred to complete the questionnaire by themselves, and this was obliged whenever all persuasions for an interview failed.

The purpose of the formal survey was to enable an establishment of the quantities of products being used by specific categories of industries, with the prime objective of stratifying the market and knowing the size and relative importance of the various market segments so as to target appropriate products for development.

RESULTS AND DISCUSSION

A summary of the results of the study, the secondary data reviewed and the deductions therefrom are shown in the Tables 1 and 2 respectively. Further details are shown in the Appendices. A total of 27 industries were covered in the survey. These included 3 Animal Feed Mills, 2 Confectionery Industries, 1 Paper packaging industry, 9 Pharmaceutical industries, 10 Plywood industries, 1 Textile industry and 2 wheat milling industries.

Types and Sources of Industrial Products Currently In Use

The types of potentially replaceable industrial products identified included:

- Maize and wheat flour,
- Wheat and wheat flour,
- Maize, wheat and potato starches (native or modified),
- Glucose syrup and
- Ethanol.

The sources of these products included local as well as foreign. Some of the countries from which these industrial raw materials are imported include, Germany, Netherlands (Holland), France, India, United Kingdom, Italy, America and other unspecified European Countries. Details of the type of products imported from specific countries can be seen in the Appendices. The annual utilization of these products per company ranged

- Cassava starch is heavier, so may affect disintegration and dissolution hence a lot of experimentation is needed to resolve this problem
- Cassava starch is not suitable for pharmaceutical preparations so its use will call for revision of product formulations.
- The fact that a sister company had tried the use of cassava in animal feed and had failed.

The concerns raised against the use of cassava-based products came principally for the pharmaceutical industries and this is to be understood. The production of drugs involve the use of the highest quality raw materials, and hence the scrutiny to which the cassava products are being subjected by the pharmaceutical companies. This is certainly not a deterrent for the use of cassava-based products but rather a challenge to improve upon the production practices of cassava-based products so as to meet the high standards required of the products if the pharmaceutical industries are to be a targeted market. The non-food sector which is a low risk area could however be targeted to start with whilst steps are taken to improve quality so as to meet the requirements of the high risk sectors – the food and drugs sector.

Table 1: Market Potential For Cassava-Based Products

Current/Previously Used Industrial Raw Materials				Cassava-based Industrial Alternative		
Product	Quantity Imported or Produced, Locally (tons)	Sector using Product	Quantity Used (tons)	Product and (level of substitution)	Potential Quantity Needed (MT of Product/ annum)	Theoretical Market Potential (MT of Fresh Cassava/ annum)
Wheat + Flour,** (Wheat Equiv.)	240,230	Plywood Industry Others (Bread, Biscuits and Snacks)	1,681 208,549	Cassava Flour (100%) Cassava Flour (10%)	1,681 20,855	8,405 104,275
Starches* (maize, wheat, potato)	1254	Pharmaceuticals Textile Others (Paper, Processed Foods etc)	687 187 380	Cassava Starch (5%) Cassava Flour/Starch (100%) Modified Cassava Flour/Starch (50%)	34 187 190	170 935 950
Ethanol**	9,580	Pharmaceuticals Others (medical, beverage, scientific)	265 9315	Cassava-derived industrial alcohol (100%) Cassava-derived industrial alcohol (100%)	265 9,315	4,732 166,339
Glucose/Glucose Syrup*	912	Pharmaceuticals Others (Confectionery, biscuits etc.)	35 877	Cassava-derived glucose syrup (100%) Cassava-derived glucose syrup (75%)	35 657.75	175 3,288.75
Maize + Flour ** (Maize Equiv.)	1,096,884	Livestock Feed Others (Human consumption and other industrial use)	1,882 1,085,002	Cassava Chips or pellets (10-20%) No Cassava Substitute	1,782.3 -	8,911.5 -
Total Market Potential Demand						298,181.25

* Figures quoted are Year 2000 figures (the most current available for these products)

** Figures quoted are Year 2002 figures (the most current available for these products)

Table 2: Ghana's Import Figures for Various Products.

Product	Annual Imports (Mt)					Average
	1998	1999	2000	2001	2002	
Wheat + Flour** (Wheat Equiv.)	288,090	218,532	277,530	191,973	240,230	
Starches*** (maize, cassava, wheat, potato etc.)	910	840	1254	-	-	
Ethanol#	6,909	8,820	5,097	7,952	9,580	
Glucose/Glucose Syrup***	622	765	912	-	-	
Maize + Flour* (Maize Equiv.)	1,015,029	-	-	937,973	1,096,884	

Sources: * Local production of maize (MOFA, SRJD-1999,2002,2003); ** FAO Database (2004). ***UN Statistical Division (2004). # Ghana Statistical Service (2002)

NOTES:

- Theoretical Market Potential was calculated on the basis of:
 - 20% recovery of starch and flour from fresh cassava
 - 5.6% recovery of alcohol from fresh cassava
 - 100% recovery of glucose syrup from starch ==20% recovery of glucose syrup from fresh cassava.
- % Substitution of Cassava derived glucose syrup should have been 100% but considering that the import figure was both glucose and glucose syrup it was assumed that glucose accounted for 25% of imports whilst glucose syrup accounted for 75%. 100% was therefore used to compute the potential quantity needed for the pharmaceuticals since the figure quoted for pharmaceuticals was all glucose syrup; whilst 75% was used to compute the potential quantity needed for the rest (being a combination of glucose and glucose syrup).
- For livestock feed the 10% substitution level is for poultry whilst the 20% substitution level is for piggery. The average of 15% was used to compute the theoretical market potential.

CONCLUSION

On the basis of the objectives of this survey it may be concluded that the cassava-based products for which there is industrial potential are, high quality cassava flour, cassava starch, modified cassava flour/starch, cassava-derived industrial alcohol, and cassava chips or pellets. These products are expected to replace imported alternatives in the plywood, pharmaceutical, textile, confectionery and livestock feed industry. The survey was however not exhausted enough to stratify the markets with respect the bread, biscuits, snacks, paper, medical, beverage and other processed food industry. This is because of the lack of time and financial resources. The information obtained however is enough to give an idea of what the potential market is. Further work would however be required to establish the volume of products that would meet the demands of each of the end-user sectors. From the results the theoretical market potential for fresh cassava is over 297,000 tons per annum. The estimated specific requirements for each cassava-based product is 22,536 tons for cassava flour, 221 tons for cassava starch , 190 tons of modified cassava flour/starch, 9580 tons of cassava-derived industrial alcohol, 692 tons of cassava-derived glucose syrup, and 1,782 tons of cassava chips/pellets.

REFERENCES

Graffham A.J., Ababio J. T., Nanam Dziedzoave, George Day, Abigail Andah, Agnes Budu, Ayernor G.S., Stephanie Gallat and Andrew Westby. (1998). Market Potential For Cassava Flours And Starches In Ghana. *Journal of Tropical Agriculture. (Trinidad)*, 75(2): 267 -270.

APPENDICES

Appendix I Sample of the questionnaire used in the survey.

(The detailed questionnaire developed for this survey is a 28 page document, containing 11 questions. However the full document is not intended for use during individual interviews. Only two questions are used from each industrial visit. The first is common to all types of industry, and the second is selected from questions 2-11 which are more or less product specific. The sample provided here is just a representative section [Questions 1 and 11] of the actual questionnaire used.)

DATE:

Before asking questions make clear the purpose of the visit and give brief details of the project and its expected outcomes. You should provide brief details on the potential of cassava for the specific user, quoting examples from other countries or regions (Uganda, Nigeria, India, Thailand and Latin America (Brazil & Colombia).

QUESTION 1.

(always try to get a business card, as this might be useful later, do give copy of letters FRI letter)

1.1 General information

Company name:

Full postal address (*with details of physical location*):

Phone (*with area code*):

Fax:

Mobile:

Email:

Name of respondent(s):

Position:

1.2 Type of business (*eg plywood factory, textile mill etc*):

1.3 How long has your business been operating?

1.4 Product range? (*eg non water resistant paperboard, water resistant board etc*):

1.4b Which of your products is most important to you? (in term of sales)

1.6 What has been your annual output over recent years? (*tonnage or value, whichever is most appropriate, for a large factory tonnage is best, for a bakery an estimate of value would be more appropriate*):

1.6b For the industry as whole, is demand for your main products static/increasing or decreasing: (*this question should help us to estimate market potential*)

1.7 What are your markets (*local / export / both, if both then what are the proportions for each market eg local 60% export 40%*):

NAME OF COMPANY:

DATE:

QUESTION 11: STARCHES, SUGAR SYRUPS AND ETHYL ALCOHOL FOR PHARMACEUTICALS.

11.1 What type(s) of sugars/sugar syrups, starch or alcohol do you use in your products (*glucose syrup, maltodextrins, high fructose syrup, native starch or modified starch, ethyl alcohol*; source (*imported/local get details of supplier in each case*), amount of product required per kg of final product, cost and month of purchase.?

Type of product (NB repeat for each purchase made*)	Source	Amount used per kg of product (approximate)	Cost (note what price is quoted: CIF, FOB, Border, delivered to store)	Month and year purchased

11.2 What has been your annual utilisation of each type of product in recent years?

11.3 Have you ever used cassava-based products? (*if yes who supplied it and if not using now what was the reason for stopping use*)?

Potential purchase of cassava based raw materials

11.7 If you don't use cassava based raw materials now, would you be prepared to do so in the future?

- If yes, why? (reasons, and conditions that have to be in place)
- If no, why not? (reasons, constraints)

If the answer was NO, go to Q11.18

11.8 Quantities of cassava based products potentially required in the future? Rates of substitution (e.g. cassava starch for maize starch) ?

11.10 What prices would you be prepared to pay for cassava based products (range of price depending on quality). Is price for product "delivered at factory gate".

(If the person interviewed cannot give a clear price, try to obtain a price ratio, for example, dried cassava chips compared to maize, or cassava flour compared to wheat flour).

Follow-up

11.18 Would you be interested in receiving a copy of the findings and recommendations of this study?

11.19 Would you be interested in being involved in future activities (*eg industrial trials of cassava based products*)?

11.20 If necessary, would you mind if we came back to ask you more questions?

Appendix II Types and Sources of Products

Company	Industrial Sector	Type of Products Used	Source	Annual Utilisation
Gafeo Feedmill	Animal Feed	Maize Wheat Cassava chips (discontinued)		
Divine Feedmill Ltd.	Animal Feed	Maize	Local (mainly from B.A.) Takoradi	1,000 tonnes
		Wheatbran Soyacake Fish	Flourmills	
Central Feedmill Ltd.	Animal Feed	Maize Wheatbran	Local (mainly from B.A.) Takoradi Flourmills	882 tonnes 275 tonnes
Long Life Confectionary	Confectionery	Sucrose Glucose syrup	Local market Germany	
Cocoa Processing Co. Ltd.	Confectionery	Maize flour Glucose syrup (40-60) Sucrose	Netherlands Netherlands, Local France	4 tonnes
Polykraft, Tema	Paper Packaging	Maize Starch (Modified) Glue Collys	India U.K. U.K. Italy	360 tonnes
Phyto-Rikker	Pharmaceutical	Maize Starch Ethanol Sucrose	U.K. Germany	12 tonnes 10000 litres 43 tonnes
Starwin Products Ltd	Pharmaceutical	Potato starch Maize starch	U.K. U.K.	10 tonnes Negligible (0.5 tons pre-gelatinised starch)
		Ethanol	MES (local importing company)	
Letap Pharm Ltd.	Pharmaceutical	Maize starch Ethanol Sucrose	Europe	120 tonnes 96 tonnes Negligible

Appendix III: Contact Details and Years of Operation of Companies

	Company name	Type of business	Name of respondents	Position	Duration of Business operations	Contact details
1	Omega Processing Company	Plywood Factory	Steve Opaku	Plywood Manager	5 years	P.O. Box KS 4595 Ahinsan, Kumasi Tel: 051-24895/22632 Fax: 051-24447 Email: owpl@ghana.com
2	C. Korsah Family Company Limited	Plywood factory	Peter Kofi Yeboah Yaw Appiah	General Manager Production Manager	5 years	Box VP 1076, Kumasi Tel: 051-61855, 024 4751075, 020 8186959, 024 4872972 Email: ckorsahfamily@yahoo.com
3	Habitat Timber Gh. Ltd	Timber/Plywood	Nimish	Financial controller	12 years	Box 8387 Tel: 051-25981 Fax: 051-25981 Email: habitat@africaonline.com.gh
4	Top Timber Company Ltd	Plywood & Veneer	Kwaun Dapaah	Production Manager	2 years	Box 6928 Tel: 051-37530, 024 4463101
5	Fares Timber Processing Company Ltd (Kaase Industrial Area)		N. Akill Owusa Brewah	Technical Director Production Manager	6 years	P.O. Box 6013, Kumasi Tel: 051-30072, 024 347474 Fax: 051-32788
6	OTI Yeboah Complex Ltd	Plywood & Rotary Veneer	Samson Ogyiri	Production manager	7 years	Box 244, Sunyani Tel: 061-27382, 024 4734838 Fax: 061-27382
7	PledgeTex Company Ltd	Plywood factory	Mrs. Akomani Mr. Benard Yanhe	Production manager Managing Director(owner)	1 year	Box 7293, Kumasi Tel: 024 4220823/ 024 4873721
8	Wood Pillar Ltd	Plywood &	A.K. Sam	Accountant	7 years	Box 6730 Kumasi Chiraparttni

	Company name	Type of business	Name of respondents	Position	Duration of Business operations	Contact details
		Rotary Veneer				Lake Road Tel: 051-32086/7, 020 8119029 Fax: 051-28106
9	Hanmax Veneer & Ply Co. Ltd	Plywood factory	Esi A. Banful	General Manager	6 years	P.O. Box 517 Kumasi, Located adjacent to BOST Kaasi Ind. Area Tel: 051-21926/33398 Fax: 051-21926 Email: hmx@africaonline.com.gh
10	LETAP Pharmaceuticals Ltd.		Mr. Rao	Factory Manager	20 years	Box 3346 Accra-North Tel: 021-224613 Fax: 021-224693 Email: letap@ghana.com
11	KAMA Ind.Ltd	Pharmaceuticals	Paul Armah	Production Manager	18 years	P.O. Box 5437 Accra North, Accra Labone-Junction Tel: 021-782705/782707, 024 3255480 Fax: 021-762412
12	Ghana Agro Food Company Ltd.	Agro processing & Manufacturing Feedmill	Mr. Omari	Production Manager Feedmill	Gafco Feb 95 Feedmill Nov 95	P.O. Box CE 11345 Tema. Located in the Larbour area Tel: 022-204121-4 Fax: 022-204107 Email: gafco@africaonline.com.gh
13	Starwin Products Ltd		M.D. Gilbertson	Quality control Manager		Box 5760 Accra-North Tel: 021-221788/220416 Fax: 021-225039
14	Cocoa Processing Company Ltd	Confectionery & Cocoa Agro processing	Charles D. Asante	General Manager Confectionary	39 years	

	Company name	Type of business	Name of respondents	Position	Duration of Business operations	Contact details
15	Long Life Confectionery Ltd	Hard boiled sweets	Mr. Ben Antwi Osafo	Managing Director	1959	P.O. Box 5215 Accra North, Located Mile 7 1/2 old Accra Nswam Road Achimota Tel: 021-401328/400343, 0208110338 Fax: 021-401328
16	Dannex Ltd	Manufacturers of Pharmaceuticals	Mr. John Dake	Factory Manager	From 1964	P.O. Box 5258 Accra North No 5 Dadeban. Road North Industrial Area Tel: 021-232574/232575 Fax: 021-232576 Email: dannex@www.plus.com.gh
17	Ernest Chemist Ltd	Pharmaceuticals industry	Mark Owiredu	Production Manager	3yrs -factory PS/ factory started operation 3yrs ago	P.O. Box 3345 Accra, Ring Road Near Kwame Nkrumah circle overhead bridge Tel: 022305445/022305402, 020 8122057 Fax: 022 305431 Email: sales@ernestchemist.com
18	Major and Co. Mfg. Ltd.	Pharmaceuticals	Michael Ghansah	Production Director	-	P.O. Box 620, Tema, North Industrial Area, Near Crocodile Matchet. Tel: 022 306269/304255 Fax: 022 306753
19	Central Feed Mill	Feed Mill	Gabriel Agyakye	Sales Person	>20 Years	P.O. Box 1576, Accra, Adenta, Aburi Road. Tel: 021 501423 Mobile: 020 8169618
20	PAM	Pharmaceuticals	Samuel De-Abba	General Manager	10 Years	P.O. Box 625, Nsawam.

Appendix IV: Product Range, Output, and Product Demand Trends for Specified Companies

	Company name	Product Range	Most important Products (in terms of sales)	Annual Product Outputs over recent years	For the industry as whole, is demand for your main products static/increasing or decreasing	What are your markets
1	Omega Processing Company	Both water resistant and non-resistant plywood	Non-water resistant or interior plywood	12,000m ³ /annuum	Increasing	20% local 80% export
2	C. Korsah Family Company Limited	Non-water resistant		72m ³ /month	Decreasing	75% local 25% export
3	Habitat Timber Gh. Ltd	Non-water resistant paperboard	Non-water resistant	64m ³ /year	Increasing but not the copouts to produce	90% local 10% export
4	Top Timber Company Ltd	Non-water resistant	Non-water resistant	170m ³ /week	Increasing	Local market
5	Fares Timber Processing Company Ltd (Kaase Industrial Area)	Moisture resistant	Moisture resistant	6500m ³	Increasing	80% local 20% export
6	OTI Yeboah Complex Ltd	Non-water resistant	Non-water resistant	1800m ³ /month	Fairly constant, no decrease	30% local 70% export
7	PledgeTex Company Ltd	Non-water resistant	Non-water resistant	500 sheets/day 4mm	Increasing	100% local
8	Wood Pillar Ltd	Non-water resistant paperboard	Non-water resistant paperboard	300m ³ /month	Increasing (not able to meet demand)	5% local 95% export
9	Hanmax Veneer & Ply. Co. Ltd	Ceiba Rotary Veneer/ Non-water resistant Ceiba 4mm plywood	Ceiba 4mm plywood Non-water resistant	720,000 sheets 8,574m ³	Increasing	80% local 20% export (W.A. subregion)
10	LETAP Pharmaceuticals Ltd.	Tablets, Capsules, Syrups	Tablets		Static	5-10% export
11	KAMA Ind. Ltd	Syrups, Capsules.	Mixtures, Syrups		Increasing	Local