Potential Size of the Ghanaian Domestic Market for Instant Fufu

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Summary

In seeking evidence of the need for further research on industrially manufactured cassava based staple food products, the potential size of the Ghanaian domestic market for instant fufu powder was estimated. Methodological difficulties and data inconsistencies restricted the accuracy of the estimate. However, using sensitivity analysis, it was estimated that a range of 1,000 to 17,100 metric tonnes in which the true annual potential demand for instant fufu powder probably lies. Even the lower limit would represent a substantial new opportunity for Ghanaian food manufacturers, albeit one that would not be easy to exploit (in particular, manufacturing costs would have to be reduced substantially and promotional campaigns would have to be pursued vigorously)

The estimated range translates to a 2,000 to 34,200 metric tonne derived demand for fresh cassava roots (approximately 0.8% to 13.2% of total trade) and a substantial demand for plantain, all of which could be supplied by Ghanaian farmers. Although the potential demand for other manufactured cassava based staple foods is currently unquantified, it is likely that farmers would enjoy substantial added benefits if these markets could be exploited.

All analysis in this report relates specifically to the domestic market for instant fufu. The export market has been exploited to a much greater extent but almost certainly still holds considerable potential.

Introduction

DFID research project R7580 and EU project EU ICA4-CT-2002-10006 are working to ensure that the marketing of cassava into new markets offers the potential to enhance poor farmers' income and provide employment opportunities for impoverished rural and urban people. The project is investigating how processing of high quality cassava based staple food products can be improved in order to meet identified market demand in urban areas.

In March 2001, the consumer market research company Research International (RI) completed an assignment for the projects that analysed various aspects of the Ghanaian market for manufactured cassava based foods. In its original terms of reference, RI was asked to determine public awareness, consumer attitudes, optimum pricing levels, and the potential size of the market. RI shied away from estimating the market size, claiming that the task was beyond their abilities. Nevertheless, the research team remained interested in gaining an estimate, not least because part of the justification for continuing and perhaps expanding the research project depends on sufficiently large potential sales in Ghana.

The research team decided that a rough estimate of demand could still be made by combining information from the RI dataset and the Ghana Living Standards Survey (GLSS) of 1998/99. The RI survey was conducted on the basis of a stratified random sample of people within a range of Living Standard Measure (LSM) categories. In the LSM system, households are graded one to ten (ten denoting the highest living standard) using the responses to a series of questions about household utilities, assets and levels of education (Appendix 1). Some of the same questions were asked in GLSS4, a country-wide survey covering all aspects of household assets, consumption, expenditure, income and output. The GLSS4 sample was designed to be nationally representative[1], and so inferences about the characteristics of the national population can be drawn by using weights and multipliers.

[1] Although it was not self-weighting like GLSS3

The intention of the analysis described in this report was to use the GLSS4 data to estimate the total number of households in the RI survey areas (Accra, Tema, Kumasi and Sekondi/Takoradi) that fall into the relevant range of LSMs. From this and from data collected by RI on consumers' intentions to purchase, the potential size of the Ghanaian market for instant fufu was estimated and subjected to sensitivity analysis.

The Research International stratified sample

Before conducting its survey, RI judged that middle class consumers were the most likely potential purchasers of the packaged cassava based foods. Consequently, RI stated their intention to stratify its sample to include 49% in LSM groups 5 and 6, and 51% in LSM groups 7 and 8. In the event, RI was less than rigorous in stratifying its sample – a few households fell into groups 4 and below, while numerous households fell into groups 9 and 10. In effect, the sample became a random selection of households within affluent areas of Accra, Tema, Sekondi/Takoradi and Kumasi. This was perhaps not a bad thing because it did not restrict the sample.

Matching the RI and GLSS datasets

On closer inspection, the relevant parts of the GLSS4 and RI datasets were not as good a match as had been hoped for. This had the effect of restricting the number of key variables that could be used to link the two datasets. The search for the key variables started with an examination of the RI dataset to establish which of the LSM questions (Appendix 1) had the greatest influence on determining whether a household fell within the RI sample or not. The following variables emerged (note that the total sample size was 350 households):

- Flush toilet in home? (328 yes, 22 no)
- Electricity in home? (342 yes, 8 no)
- Deep freezer or fridge in home? (321 yes, 29 no)
- Main source of water? (333 internally piped, 13 rain tanks, 4 other)

These variables were then cross-checked with the GLSS4 questionnaire to see whether the questions asked in the RI and GLS surveys were compatible. In the event, "electricity in home?" had to be abandoned because the GLSS4 survey did not specifically ask this question.

At this stage, criteria were needed for deciding whether a GLSS4 sample household could be considered to fall within the category of households sampled by RI (in effect, LSM groups 5 to 10). In the absence of a more sophisticated alternative, a method of scoring and aggregation was used. A household scored one point if it had a flush toilet, another point if it had a fridge or freezer, and a third point if it had internally piped water. Households scoring two or above were tentatively assumed to be in the LSM 5 to 10 category.

To give some credibility to this somewhat arbitrary categorisation, the RI dataset was subjected to the same criteria. The results tended to support the system of categorisation: 302 of the 350 RI survey households had an aggregate points score of three, a further 41 scored two points, yet only 7 scored just one point and none scored zero. Excluding households in the GLSS4 dataset that scored one is therefore on the prudent side of cautiousness: It is possible that some of these households would in reality fall into the LSM 5 to 10 group but the total number is likely to be small. If their exclusion results in a conservative estimate of the potential market size, this is perhaps no bad thing.

There is of course a theoretical problem with the methodology. Just because a random sample of households in the affluent areas covered by the RI survey returned a large number of households that scored three points, there is no guarantee that a similar pattern could not be found in samples where the affluence of the area is not taken into account. The assumed match between the RI and GLSS4 datasets could therefore be spurious. However, common sense suggests that in a developing country such as Ghana, amenities such as flush toilets, fridges and piped water denote high standards of living and would not be found in the great majority of poor households (broadly, LSM groups 1 to 4).

Results

After applying the relevant weights and multiplier to the GLSS4 data, the following estimates (rounded to the nearest thousand) of households falling into the LSM 5 to 10 category were made:

Table 1. Estimated number of LSM 5 to 10 households

	No. of households	Average household size
Accra	91,000	3.49
Tema	108,000	4.22
Kumasi	113,000	3.66
Sekondi/Takoradi	12,000	3.95
Ghana	424,000	4.09

Source: Authors' estimations using GLSS4 dataset

Estimates of potential market size

After trying the instant fufu during the RI product placement trial, an overwhelming proportion of participating consumers claimed that they would either probably or definitely buy the product if it was sold at a reasonable price. Table 2 gives the responses for the four centres surveyed during the RI fieldwork.

Table 2. How likely would consumers buy instant fufu?

Centre	Would definitely not buy	Would probably not buy	Not sure	Would probably buy	Would definitely buy	Sum
	%	%	%	%	%	%
Accra	0	2	0	21	77	100
Tema	0	0	8	38	54	100
Kumasi	2	8	4	26	60	100
Sekondi/Takoradi	0	0	4	26	70	100

Source: Authors' estimations using RI dataset

Table 3 gives an indication of the frequency with which consumers from the different centres would buy instant fufu.

Table 3. How often would consumers buy instant fufu?

	Two times a week	Once a week	Once a fortnight	Once a month	Never	Sum
	%	%	%	%	%	%
Accra	17	64	13	6	0	100
Tema	19	31	8	42	0	100
Kumasi	54	30	6	8	2	100
Sekondi/Takoradi	28	54	11	7	0	100

Source: Authors' estimations using RI dataset

Interestingly, although the smallest proportion of interviewees claiming that they would probably or definitely buy instant fufu came from Kumasi, the reported frequency with which these same people would buy fufu was substantially greater than claimed in the other urban centres. This perhaps indicates that people from Kumasi, who are generally Ashantis, are large but discerning consumers of fufu.

Table 4 gives the results of converting the claimed frequencies into a weighted average number of packets purchased per week[2].

Table 4. Claimed purchase intentions: Weighted average number of instant fufu packets purchased per week by urban centre.

	Weighted average number of packets purchased per week
Accra	1.1
Tema	0.8
Kumasi	1.4
Sekondi/Takoradi	1.2

Source: Authors' estimations using RI dataset

Assuming that the weight of a packet of instant fufu is 1kg (the pack weight used in the RI placement trial) and, for the time being, that the actual proportion of all LSM 5 to 10 consumers in the four urban centres that *would in reality* buy instant fufu is accurately reflected in the RI categories "would probably" and "would definitely" buy instant fufu, then the following estimates of potential annual demand apply (Table 5 – all figures rounded to the nearest 100 tonnes):

Table 5. Estimated potential annual demand by urban centre

	Tonnes per annum
Accra	4,900
Tema	4,300
Kumasi	7,200
Sekondi/Takoradi	700
Total	17,100

Source: Authors' estimations using GLSS4 and RI datasets

In their report, RI warn about the likelihood that the trial participants overclaimed their purchase intentions. In this light, the 17,100 tonne estimate probably serves as an upper limit to potential demand. Table 6 gives a range of figures for estimated potential annual demand, incorporating various degrees of overclaim. For instance, 75% overclaim means that only 25% of those who claimed that they would either "probably" or "definitely" buy instant fufu actually do so, and that they only buy a quarter of the quantity they claimed they would.

Table 6. Sensitivity analysis using different levels of overclaim

	Level of overclaim			
	0%	25%	50%	75%
Potential demand in 4 urban centres (tonnes)	17,100	9,700	4,300	1,000

Source: Authors' estimations using GLSS4 and RI datasets

75% overclaim would be an unexpectedly large rate, whereas 0% would be extraordinarily low. We can therefore state that, providing our estimates of the number of Ghanaian households that fall into the LSM 5 to 10 category is accurate, the true potential market size probably lies between 1,000 and 17,600 tonnes per annum.

[2] Weights merely reflected the frequencies reported in Table 3 and were used to estimate the number of packets consumed per week.

Discussion of the results

Although the sensitivity analysis in the previous section describes a large and arguably unhelpful range in which the true market potential probably lies, the point of the exercise was to establish whether there is significant potential demand for instant fufu and therefore a substantial derived demand for cassava roots for processing into cassava flour. Taking the smallest estimate of 1,000 tonnes and assuming that cassava flour constitutes 40% of the instant fufu powder[3], the equivalent demand for cassava roots would be approximately 2,000 tonnes a year[4]. At 17,100 tonnes of instant fufu powder consumed per year, the equivalent demand for cassava roots would be about 34,200 tonnes.

Credible estimates of the total quantity of cassava that is traded in Ghana are hard to come by. However, by taking GLSS4 information on the value of cassava sold during the survey year (1998/99) and dividing it by the average price of cassava for that year (also generated by GLSS4) one arrives at a figure of 260,000 metric tonnes of cassava traded per annum (fresh root equivalent, rounded to the nearest 10,000 tonnes)[5]. Assuming this to be a reasonably accurate estimate, the potential increase in demand for cassava roots generated by the exploitation of the domestic instant fufu market lies between 0.8% and 13.2%.

Clearly, if 17,100 tonnes of instant fufu could be supplied to the market, this would represent a large opportunity both for food manufacturers and cassava farmers in production areas that could supply cassava roots cost effectively and reliably. Because instant fufu contains a large proportion of plantain flour (approximately 60%), there would also be an opportunity for similarly capable plantain farmers.

Even our lowest estimate of potential demand represents a modest but significant opportunity for Ghana's food manufacturing industry. Although accurate figures for the industry's current maximum output are not available, we estimate that 1,000 tonnes represents an increase of two thirds over current maximum output. This assumes that all current manufacturing capacity is devoted to instant fufu production, whereas in reality, a substantial portion is devoted to producing other foods such as kokonte (100% fermented kokonte flour) and banku (1:1 cassava to maize flour).

The RI research only conducted placement trials on instant fufu. Drawing inferences on the potential market for kokonte and banku from the instant fufu research results would stretch the credibility of the analysis too far. Instant fufu is both convenient and safe, whereas packaged kokonte and banku merely appeal to consumers on the basis of food safety alone. The degree to which consumers will switch to manufactured forms of kokonte and banku could only be estimated through more consumer market research. However, one thing is clear: The opportunity for Ghanaian farmers to supply an expanded staple food manufacturing sector is not limited to the raw materials used in instant fufu.

In practice, sales of instant fufu and other cassava-based foods will be influenced by the effectiveness of promotional campaigns. A minority of RI respondents (39%) were aware of at least one of the manufactured cassava food products. The RI report suggests ways in which promotions can be targetted in order to have the maximum appeal to potential consumers.

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[3] Most of the manufacturers currently use 40% cassava starch in their instant fufu mixes. One of the aims of our research project is to convince manufacturers that they can replace the imported cassava starch with domestically produced cassava flour, thereby benefiting Ghana's balance of payments and providing market opportunities for Ghanaian farmers.

[4] This assumes a 20% conversion of fresh roots to cassava flour.

[5] According to GLSS4, approximately 21.5% of all cassava that is harvested is sold.

Other factors will also influence the degree to which market potential will be realised. The quality of the products and the degree to which they live up to consumers' organoleptic requirements will have a significant influence on sales. Similarly, product pricing will have a major impact. The RI respondents who tried the instant fufu during the product placement trial were asked whether they would buy the product *assuming* that the price was "right". There can be little doubt that the current price of instant fufu puts off all but the most dedicated of convenience food shoppers in Ghana. In our view, the greatest challenge in exploiting the potential market will be in bringing down the cost of production. This can only be done through developing economies of scale.

All our analysis has concentrated on the domestic market. However, to date, the export market has absorbed an estimated 95% of manufactured cassava food output, yet almost certainly still holds unrealised potential. Export marketing requires very little effort because the manufactured cassava products tend to sell themselves to ex-pat West-Africans[6]. In this light, the business risk of expanding output diminishes somewhat and investments look more promising.

Bibliography

Ghana Statistical Service (2000) "Ghana Living Standards Survey: Report Of The Fourth Round (Glss 4)" Accra, Ghana.

Ghana Statistical Service (1998) "Ghana Living Standards Survey 4: Household Questionnaire. Part A" Accra, Ghana.

Ghana Statistical Service (1998) "Ghana Living Standards Survey 4: Household Questionnaire. Part B" Accra, Ghana.

Ghana Statistical Service (1998) "Ghana Living Standards Survey 4: Price Questionnaire" Accra, Ghana.

Research International (2001) "Final Report on Processed and Packaged Cassava Based Foods Market Survey" Accra, Ghana.

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[6] The major export difficulty is finding an agent or wholesaler who is willing to play fair and pay by letter of credit either on presentation of documents or on receipt of goods. However, commercial difficulties also exist in the domestic market, where the supermarket buyers are often poor payers.

Appendix 1. Living Standard Measure (LSM) Categorisation

RULES FOR CALCULATING LSM'S FOR SUB-SAHARAN AFRICA

INSTRUCTIONS: If possible record the answers to each question by observation. If observation is not possible, ask the question. Circle either YES or NO in each row. Take note of those questions where only one YES answer is valid.

Add all the circled numbers in the YES and NO columns, and then add these two sub totals together. Take note of minus (-) numbers. You must subtract these. Remember to add the constant in every case.

ITEM	YES	NO	
Do you have a toilet in your home or on your property?	0	-114	
Do you have a flush toilet in your home or on your property?	114	0	
Do you have hot water on tap at home?	33	0	
Do you buy most of your groceries at a self-service supermarket?	50	0	
Is the main earner in your household paid weekly or monthly?	47	0	
Is there mainly clay/earth flooring in your home?	-40	0	
Do you have a built-in kitchen sink in your home?	60	0	
Does any member of your household own a car?	39	0	
Do you have electricity in your home?	33	0	
Do you have a deep freezer or fridge/freezer in your home?	29	0	
How many different women's magazines do you (the housewife) buy per month?			
1	10		ONLY
2	20		ONE
3	30		YES
4	40		
5 or more	51		
Is your home a formally constructed building?	25		
Which one of these is your main source of water?			
Piped into the house	39		ONLY
Piped to a tap on property outside the house	31		ONE
Rain tanks on your own property	31		YES
Communal tap	23		
Communal pump	16		
Communal well	8		
Stream/river/lake/dam	1		
Other/none	0		
Do you have an electric, gas or wood-fire stove in your house?	-29	0	

What is the highest standard of education of the respondent?			
No school	0	0	ONLY
Some primary school	18	0	ONE
Primary school complete	30	0	YES

Some high school	41	0
High school completed	59	0
Some university	65	0
University complete	77	0
Other	53	0
Constant (Always and this)	795	0
SUB-TOTALS: Yes and No columns		
TOTAL Yes plus No columns		

INSTRUCTIONS: Use the table below to see which LSM group the respondent belongs to. Write their group number (between 1 and 10) in the space provided.

SCORE		LSM
FROM	TO	
0	680	1
681	740	2
741	780	3
791	820	4
821	860	5
861	900	6
901	950	7
951	1050	8
1051	1160	9
1161		10