



INTERNATIONAL RESEARCH INSTITUTE FOR FOOD AND AGRICULTURE

ECONOMICS OF FEEDING COURSE PARTICIPANTS

AT

GREENHILL

V

By:

C. K. QUARTEY

INTERNATIONAL RESEARCH INSTITUTE FOR FOOD AND AGRICULTURE

AUGUST, 1985.

INTERNATIONAL RESEARCH INSTITUTE FOR FOOD AND AGRICULTURE

A C K N O W L D G E M E N T

I should like to thank all those who assisted me in this study. They include Esther F. Anagbonu, Edwine Yirenkyi, B.P. Osae and Ben Awotwi, all of whom assisted in the gathering and processing of data.

The Ag-Director for Training Mr. S.A. Amoa and Dr. S.S. Kwakye and Mr. K. Abedi Boafo all of GIMPA deserve special mention for their efforts as workshop co-ordinators

I am also grateful to all the line officers linked to the Catering Services at GIMPA for their co-operation in this exercise. I should also like to thank Miss Georgina Nassar for kindly agreeing to type out this work.

A B S T R A C T

This study looks at the costs involved in feeding GIMPA course participants. Use was made of model building, breakeven analysis and simple statistical tools as the arithmetic mean and standard deviation. Results of study indicate fairly good pricing system and suggest an approach for computing future charges. Also study indicates that, for optimal performance of kitchen facilities the number of students to be catered for at any point in time should be greater than 20. Another important deduction is the need for regular analysis of kitchen returns to enable line offices to advise themselves as to how they are operating within their budget constraint.

Self-reverence, self-knowledge, self-control. This three alone
lead life to sovereign power. Yet not for power (power of
herself would come uncall'd for) But to live by Law; Acting the
Law we have by without fear: And because right is right to follow
right were wisdom in the scorn of consequence.

Tennyson.

11/2

1.1. The Importance of Feeding Problems and Ghanaian Institutions.

Problems concerning food have assumed alarming proportions in Ghana.

1. Institutions and schools have gone on rampage over issues concerning food. Over the same period, some have made strenuous efforts at reducing food cost by establishing school forms. At the Ghana Institute for Management and Public Administration however, the establishment of forms by course participants cannot be applied. This is because courses are of short duration, and intensive, with participants drawn from various countries. Cost per participants charged at Greenhill has however, been increasing. A management course valued at ₵2,000 a couple of year ago, is now ₵20,000 i.e. ten times its former cost. Boarding or specifically messing cost is the prime factor in the calculations of fees charged at Greenhill. So far there has not been any study or investigation into the economics of feeding participants.

1.2. Re Objectives of the Study

This paper therefore seeks to investigate the food problem at the Institute. The objectives of which shall be:

- (i) To determine the cost structure of feeding participants.
- (ii) To determine whether or not there is any evidence of 'economics of scale'.
- (iii) To determine the breakeven point for operating kitchen facilities.
- (iv) To outline a frame work or formula for determining messing charges
- (v) To outline the organisation of feeding participants.
- (vi) To make recommendations for the minimization of cost.

1.3 Hypothesis

This study would seek to prove that it is possible to feed participants at a cost that is lower than the existing rate of ₵281 per day without sacrificing standards.

i.e. • \neq ₵281.

Where C is cost of messing per participants per day. The outlook of this study it must be emphasised is positive and seeks to explore ways of minimizing feeding cost at Greenhill.

1.4. Methodology

The main research technique is record analysis, i.e. the study of existing data on feeding course participants. This is supplemented by interviews using a designed questionnaire and an interview guide. The primary sources of information include the matron and kitchen-store keeper, the internal auditor, canteen committee members, Bursar, Director for Training, Assers officer, Estate Officer, Supply and Purchasing Officer. Additionally convenience sample of course participants was interviewed as to their views on how cost could be reduced.

The data sort include purchases of food items, quantities, cost, sources of supply and number of participants served per day, storage facilities, salaries, maintenance etc. Data collected was largely time series by nature. Also, an answer to the question of: who does what in the organisation of feeding participants was considered.

This investigation is essentially a cost study using economic - engineering and statistical model approach. First the model frame work was developed followed by the determination of the cost functions.

(A) The Development of the Model

For the model development the following steps were followed:

- (i) full capacity level, measured by the number of participants for the existing kitchen facilities was specified,
- (ii) specification of on and off season
- (iii) specification of overhead items

(B) The Determination of the short Run Cost Function and the Revenue Functions

After the development of the above framebook the cost function were determined by the following process.

- (i) Determination of fixed cost for the two capacities
- (ii) Determination of variable cost for the two capacities
- (iii) Computation of total cost for the two capacities.

1.5. Assumptions

Since certain information and data in the study were not absolute but rather dependant upon other factors and subject to change, the following assumptions were made.

1. that the Institute is financed through government subventions, and is a non-profit making organisation
2. that the months of May and October are representative of off and on season conditions respectively
3. that existing kitchen facilities can cater for 90 participants - house the full capacity level
4. not included in the feeding costs are : storage cost, electricity and water usage, charcoal and transportation
5. that cost and revenue functions are linear
6. that kitchen facilities constitute the most important factor in the admission of participants
7. 'scale' in the study is measured by the number of participants served.

1.6 Organisation of Report

The report is presented in four parts. The first considers the food problem and the methodology. The second dwells on the cost aspects. The third part presents Static Analysis, while the last part gives consideration to messing at lower cost.

2.0 COST

2.1 The Three Theoretical Approaches

The approaches to be used as already indicated are the economic - engineering and statistical.

The economic approach involves the classification of cost into fixed and variable on the basis of judgement and inspection. The statistical involves the determination of the cost function by record analysis. The third approach i.e. engineering is based on engineering conjectures modified by experience of practical processors.

These approaches are not mutually exclusive and the on-going study uses an amalgam of the three

2.2. Estimation of Cost

Food Items: The most important input in the feeding of participants is of courses the various food item which range from the staples i.e. maize rice, fish cooking oil, meat bread and sugar to dessert items as orange watermelon and peaneapple.

Using the combined requisition and Issue vouchers, which indicates the usage of material from the kitchen stores and their values and the number of participants served, the cost of messing a participant per day was computed.

Table I Cost of messing - Participants Per Day

Meal	May 1984	October 1984
Breakfast	₦23.59	26.08
Lunch	206.43	88.89
Supper	188.35	83.88
Snack	13.72	20.49
Total	₦ 432.09	₦227.34

Source: Calculated from combined requisition (CR & IV) and issue voucher (CH & IV) over periods indicated.

Table 1 is a summary of messing cost per participant per day for the two seasons. The month of May representing the offseason and October representing the on-season. As expected there is a fall in the total cost of messing per day, from ₦432.09 in the off season to ₦227.34 in the onseason. Both lunch and supper cost show a decline. The prices for breakfast and snack on the other hand show a rise which may be due to the sugar content. It must be mentioned that the cost per snack in October was higher than the cost of breakfast.

Labour As Overhead

The second most important cost item in the feeding of participants is labour. There is an Assistant Catering Officer, eleven stewards including the head, 9 cooks including the chief cook and 7 pantry boys including the foreman. Since their salaries are traditionally borne by government as part of overhead expenses, one could argue for its exclusion in this analysis.

However, to obtain the right perspective and for the building up of the models that would permit further analysis, consideration is given to the overhead component of the cost. The arithmetic mean of all kitchen staff was calculated as ₦1,018.05 per month which would be assumed as the overhead expenses or the fixed cost element for feeding course participants.

Taking into consideration the inventory of kitchen items, the quoted figure of ₦1018 is extremely conservative. The normal practice would have been obtaining the current prices of the kitchen capital equipment and obtaining the total which is then amortised over the average life span. The on-going analysis should also explore the effect on the cost functions assuming an even higher fixed cost component of ₦2,500.00 i.e. more than two times the calculated figure of ₦1018.05.

2.3. Estimation of Revenue

Simply, the revenue accruing to GIMPA management for the feeding of participants is the product of the official messing charge and the number of participants at any points in time. The existing official rate is ₦281 per participant per day.

2.4. Analysis of short run cost function

Table 2 depicts two models of the short-run cost function for the two reasons. Clearly the variable cost or cost of food items that go into the preparation of meals for the participants is the most important component.

Table 2 Cost Structure
Fixed and Variable Cost.

ITEM	No. of Participants off-season model		No. of Participants On-season model	
	25/day	90/day	25/day	90/day
Fixed Cost				
Overhead	₦1018	1018	1018	1018
Variable Cost (Food Item)	₦10800	33880	5675	20430
Total	11818	39898	6693	21443
Unit cost C/day	471.7166	443.30	257.72	238.31

Source: Based on cost derived from table 1

This is also the portion that is absorbed by the participants. The other component i.e. fixed cost is constant, and does not depend on numbers of participants served. This portion is absorbed by the society. The inclusion of this aspect is however very important as it allows for further analysis. Particularly, it would enable an appraisal of efficiency of operations.

Table 2 also shows the unit cost for the two models. The unit cost being the ratio of the total cost to the number of participants. The trend of the unit cost is an important economic indicator which leads to the answer of one of the study objectives, namely whether there is any evidence of the availability of economies of scale. Here the study defines 'scale' by the number of participants served so as to avoid determining the number of boilers or coal pots that would be needed to serve 25 or 90 participants. As the figures indicate there is a decline in unit cost with the increase in the number of participants served. In other words the increase in capacity utilization leads to a reduction in unit cost.

This relationship could be portrayed graphically by plotting unit cost against the number of participants. The two unit costs figures for each model would be points on the long Run Average Cost Curves. This would have a negative slope with the participants axis. The practical implication of this analysis is that management should ensure that the number of participants on campus at any period is closed to 90. The reason being that it provides opportunities for reducing unit cost.

The existence of economies of scale is not an automatic condition by increasing capacity. Indeed there are situations where increases in capacity leads to diseconomies of scale. This is the case where unit cost rises with increase in 'scale'. There are other occasions where increases to scale leads to no change in the unit cost and hence no economies is realised.

3.0

STATIC ANALYSIS

3.1. Break-even Analysis

The short run cost functions illustrated in Table 2 can now be put mathematically as follows:-

$$TC_{os} = 1018 + 227 X \dots \quad (i)$$

$$\text{and } TC_{fs} = 1018 + 432 X \dots \quad (ii)$$

where TC_{os} is total cost for on season model.

TC_{fs} is total cost for off season model

and X is the revenue functions can also be described as a single function of X as follows.

$$TR = 281 X \dots\dots\dots (iii)$$

where TR is the total revenue for messing

Now for the breakeven point, $TR = TC$

Solving the equations yield $X = 20$

and

$X = -6$. The latter is however meaningless in economic terms. Consideration would hence not be given to $x = 20$ obtained from on-season model, equation (I)

At $X = 20$ the $TC = \text{¢}5558$.

The above results has practical policy implications:

That it is uneconomic to operate kitchen facilities for less than 20 participants. Since the on-going analysis generates a cost per participant of $\text{¢}278$ which is close to the present charge of $\text{¢}281$, it indicates fairly efficient pricing. The cost is indeed lower, but the difference is not significant. The formula used can however be a basis for computing future messing charges.

Efficiency in pricing is not all. Efficiency in the messing of staples from stores is also important. Appendix 2 indicates the computation of the arithmetic mean and standard deviation of the staples ie, rice, meat, fish, corn dough and sugar, consumed per participant over a period of five-days. It can be inferred from the appendix requisitions from kitchen stores of the quantity of staples per participant was erratic, unstable and inconsistent. For instance requisition of rice per participant for a meal vary between 8 oz and 12 oz whereas the standard generally acceptable is quoted as 6 oz per person.

3.2. Dynamic Analysis of Static Relationships

At this juncture it is only proper to discuss the limitations of this model analysis. The economy is dynamic while the models discussed has static relationships. Although the rate of inflation has recently declined from 12% to 25% in Ghana it is still proper to consider how to deal with inflationary trends. During the lean season the regime of prices that obtains is entirely different from those that perform during the harvest season. Such models would still be relevant by simple dynamic modifications to the static relationships already established.

CHAPTER 4Missing at Lower Costs

The organisation of feeding in GIMPA has been streamlined. The line office include the purchasing officer who gbuys all food items usually in bulk, the supply officer, kitchen storekeeper, the matron and the kitchen committee. Checks are offered by the internal auditors office and the bursars office. There is also the general services co-ordinator who oversee and arrange all the services. There are stores and purchasing procedures clearly outline.

The supply officer receives food items from the purchasing office and from the food contractors. The latter supplies about 15% of the total food items used at the kitchen. The open market accounts for about 25% and the remainder of 60% is procured from government sources as the Food Distribution Corporation, Ghana National Procurement Agency, the GNPC, GIHOC Cannery Division, State Fishing Corporation and the Meat Marketing Board.

Kitchen facilities include electric cookers, gas steamers, deep freezers and cold rooms, tea boilers, iron pot, plates cups etc. Problems of catering services in GIMPA include old cooking facilities which results in lateness in serving participants and the need for an open shed for the processing of kenkey.

The main thrust of the study as has already been mentioned is the minimization of costs without sacrificing standards. As the on-going analysis indicates certain practical policy decisions could lead to the reduction of messing cost ie. operating above 20 participants at any point in time and adopting the formula as outlined in this study for charging participants. The other cost reduction strategy is the need for weekly or monthly kitchen returns on quantities used, participants served etc. which should actually be analysed. This could enable line officers to advise themselves as to their degree of efficiency with which duties are performed. Other measures are for management to explore the possibility of baking bread instead of buying largely from outside.

This study carried out thus far has to be expanded and refined in an in-depth study, positive in outlook, that would eliminate waste and ensure efficiency. Indeed there can be no economy without efficiency.

<u>Course</u>	<u>Maximum/£</u>	<u>Minimum/£</u>
2-Week workshop		
3-Week Workshop		
5-Week Workshop		
8-Week Workshop		
10-Week Workshop		
12-Week Workshop		

What factors are considered in fixing the

- (a) maximum
- (b) minimum number

6. What are the institutes main sources of supply of the following food items (indicate by % for each source)

<u>Item/Foodites</u>	<u>Source</u>			<u>%</u>
	<u>open market.</u>	<u>Comm.</u>	<u>House</u>	
Rice				
Yams, Plantain,				
Beans, groundnuts,				
Gari.				
Chicken, Eggs				
Essential Comm.				
Others.				

7. Please provide the following data for last academic term April-July 1984

<u>Food item</u>	<u>Total Quantity purchases</u>	<u>Total cost</u>	<u>Remarks</u>
Rice			
Maize			
Chicken, Eggs			
Essential Comm.			
Others			

- 8. How a control exercised over issuing of food item.....
 - e.g. (a) Record keeping system (pls, specify in details)
 - i. Please provide records in this respect for the last term for review
 - ii. Other mechanism (Pl. specify)

S/M
 What storage facilities do you have (Pl. state in detail)

10. How adequate are your storage facilities?

Adequate somewhat adequate inadequate

i. If inadequate or somewhat adequate

(a) What facilities do you need ?.....

(b) What measures do you take to stock any excess food items supplied)?

.....

ii. How much expenses is incurred in this regard

11. S/H What do you do when your storage facilities do not function?

.....

12. (Bursar) How much is charged per meal per plate participant?

Meals	Cost/Meals 1983/84 3rd Term	Cost/Meals 1984/85 1st Term
Breakfast		
Snack		
Lunch		
Dinner		

APPENDIX 2

Arithmetic mean and Standard deviations of
Quantity of Staples Consumed per Participant

Day	Quantity of Rice per participant		$(x - \bar{x})^2$
	x	$x - \bar{x}$	
1	8.88 oz	-1.41	1.98
2	10.66	-1.37	.14
3	10.66	-1.37	.14
4	9.84	-.42	0.176
5	11.42	-11.13	1.27
A. <u>Rice for Lunch</u>		$\Sigma x = 51.46$	$(\Sigma (x - \bar{x})^2) = 4.70$
	$\bar{x} = 10.29$ oz		SD = 2.16
B. <u>Rice for Supper</u>			
	$\bar{x} = 10.20$ oz		SD = .67 = 60 oz

viii. What specific problem do you often encounter in providing meals for participants).....

ix. What suggestions do you offer towards solving these problems?
.....

It is assumed that the cost of feeding participants is high, what do you think can be done to reduce the cost?.....
.....

RESPONDENTS - Matron
Director for Training DT
Supply Officer S
Purchasing Officer P
Bursar B

APPENDIX 3 : Cost per Snack

<u>Date</u>	<u>No. of Participants</u>	<u>Amount</u>	<u>Cost per participant</u>	<u>CR & IV</u>
1/10	-	-	-	37.29
2/10	50	2676	53.52	
3/10	60	2247	37.45	
4/10	60	1889	31.48	
5/10	60	1474	24.57	
8/10	67	814	12.15	
9/10	70	825	11.79	37295
			X170.96	
			X 28.49	

Source: Completed from CR & IV over the period October 1st to 9th 1984.
Serially numbered 37291 to 37295.