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Soap Pilot Plant

by Peter Donkor

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TECHNOLOGY CONSULTANCY CENTRE



**CASE STUDY NO. 3
SOAP PILOT PLANT**

BY

**PETER DONKOR
RESEARCH FELLOW**

**UNIVERSITY OF SCIENCE & TECHNOLOGY,
KUMASI, GHANA.**

JUNE, 1981.

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FOREWORD

To many people in Ghana the Technology Consultancy Centre is synonymous with soap. This is due in large part to the efforts of Peter Donkor since he joined the T.C.C. in 1973. It can truly be said that the establishment of soap plants and the production of caustic soda and palm oil have absorbed greater resources than any other project of the Centre. The work programme has resulted in some twenty small scale soap plants in Ghana and others in Guinea Bissau, Mali, Sierra Leone and Togo. It has also led to many of the soap plants producing their own caustic soda and has stimulated the establishment of some twenty small rural oil mills to supplement existing palm oil supplies.

Now Peter Donkor has been persuaded to pause in his labours to put on paper the story of eight years work and to record the experience gained. It is hoped that many will be encouraged to do what he has done: to apply the knowledge gained from a university education to solve the real grass roots problems of small-scale craftsmen and industrialists in a developing country. Peter Donkor has shown what can be done and that it can be done successfully.

The story is not complete. Many problems remain to be solved and these are given consideration here. The work is continuing. It is hoped that readers will see solutions to some remaining problems and will communicate their ideas to the T.C.C.

Peter Donkor and I wish to express our gratitude to the Intermediate Technology Industrial Services of Rugby, U.K., for enabling the T.C.C. to publish this case study.

Dr. J. W. Powell
Director

CHAPTER 1

INTRODUCTION

1.1 The Role of the T.C.C.

The Centre was established in 1972 to make available the expertise and resources of the University in the promotion of the industrial development of Ghana. Although the T.C.C. is concerned with all kinds of industrial development, its main emphasis is on the promotion of small scale industries using appropriate technologies. The method by which the centre seeks to achieve its objectives is well illustrated by this case study report. For many projects the centre acts primarily as adviser to entrepreneurs who have ideas for investment, or innovations. It also seeks to upgrade existing craft industries by the introduction of new products and improved manufacturing techniques.

The Centre does not only attempt to promote industrial development and upgrade existing craft industries by research involvement and reliance on consultancy services from other departments of the university, it also seeks to establish and run production units. In these units, production methods can be refined after the initial development of the technology, markets for the product identified, raw material sources located, managerial problems resolved, and the technical and commercial viability of the technology demonstrated to the would-be entrepreneur.

Some of the production units established by the T.C.C. on the University campus produce hand-woven textiles, steel bolts and nuts, small-scale process plant and soap.

The development and transfer of the soap project is the subject of this case study report.

1.2 Indigenous Soapmaking in Ghana

Soapmaking, which is done by the reaction of a fatty oil with caustic alkali, was an established craft among the rural population of Ghana long before the conventional pale bar soap was introduced into the country. The traditional soaps, called Amonkye, and Alata are still being produced in the rural areas of Ghana as a self-reliance policy by some rural folks who find it difficult to get pale soap. In particular, the Alata soap is favoured by many women for its cosmetic properties. The local soaps are produced by reacting palm oil or palm kernel oil with caustic potash produced from the ashes of plantain peels, cocoa pods or the roots and branches of the Kapok tree. The soaps are usually too soft for use as laundry soap.

With the introduction of pale soap into the country many traditional soapmakers have switched over from the making of Amonkye and Alata soaps to pale soap, as the basic soap making process is almost the same in both cases.

Two processes are used in Ghana for the production of sodium soap (traditionally called SODA SOAP), namely, the hot, and the cold processes. The traditional soap production involves only the hot process. The cold process produces hard sodium soap of good lathering quality but requires the use of more caustic soda. Even though it is more difficult to control, a good product is obtained when the soapmaking is done by a skilled soap maker.

Before palm oil is used for the making of soap, it is heated to a temperature above 200°C to remove the red colour. The traditional soapmaker uses a 200 litre oil drum over a wood fire to carry out the clarification of the oil and, subsequently, the boiling of the soap. When the boiling is completed, the soap is poured into wooden moulds and allowed to cool and solidify for 48 hours. The solid soap is then removed from the mould and cut into bars. In the case of the Amonkye or Alata soap, cutting is never done due to the softness of the soap. The cooled soap is therefore moulded into balls by hand.

Soapmaking at the rural level has always been on a very small scale, and its unscientific production techniques lead to a lot of production problems which are imperfectly understood and give rise to poor quality soap in terms of both the physical properties namely: hardness, colour and scent, and chemical properties, namely: caustic, fat and moisture contents.

Normally, soap produced by the soap makers is found to be soft and caustic, and does not match the taste of the consumer for laundry and bathing purposes.

CHAPTER 2

THE T.C.C. SOAP PILOT PROJECT

2.1 History:

The Centre got involved in the problems of soap making in early 1972, when it was approached by numerous small scale soap makers with requests for the analysis of their products and advice on the improvements of quality. It was felt that more help could be effectively given if the small soap makers formed themselves into a co-operative to operate a small soap plant under the guidance of the centre. This gave rise to the formation of the Ayigya Soap makers co-operative, at Ayigya, which evolved from the Kumasi Soap Makers Co-operative. Meanwhile, experiments started in the T.C.C. workshop with technologists drawn from various faculties of the University working with one of the members of the Soap Co-operative.

In 1973, the Centre made a successful attempt to secure a grant from the Ministry of Industries to construct a prototype soap plant on the

campus. Accordingly, in June 1973, the centre designed and constructed a soap pilot plant at its workshop on the university campus.

During this period, experiments were carried out with various combinations of palm oil, caustic soda and water, the basic raw materials used in the soap making. The soaps produced were tested for % moisture content which was often too high in local soaps, % free caustic alkali, which again was high in local shops, % total fatty matter, as well as physical properties like hardness, colour, scent, washing and lathering. Scientific recordings were made. Formulae that achieved reasonable results were offered to the local soap manufacturers, though they did not always abide by them and still produced soap of variable quality.

A satisfactory formula was eventually obtained and the prototype soap plant installed at the T.C.C. workshop started production on a commercial scale in September 1973. The soap plant was electrically heated, with an outer tank for bleaching and clarifying the palm oil and an inner tank for the soap boiling. The soap was brand-named ANCHOR. During the first year of operation an average of only 160 bars of soap were produced daily, because of several production and marketing problems as well as the inexperience of the soap makers in operating the plant. The production problems were involved mostly with the heating system. Heating was done using electric water heaters, which soon broke down at the high temperature of oil. Sales of the products also fluctuated according to the availability of other brands of soap notably, the Key Soap produced by Lever Brothers which was familiar and slightly lower priced due to a government subsidy. In April 1974, another soap plant was installed and started production.

2.2 Initial Production Problems and Solutions:

a. Heating:

As already mentioned, heating soon became a problem, as the average life span of the imported heaters was only 3 months. The need for the Centre to design its own heaters suitable for use in the hot oil became obvious. Accordingly heating elements wound on asbestos plates were designed. It was found that as long as care was taken in the use of the new heaters, the life span was longer than the water heaters and they could be made and repaired locally.

b. Raw materials:

Almost immediately after the commissioning of the first soap plant, caustic soda availability became a problem. ICF, (Ghana) Ltd., Tema, the main importer of Caustic Soda were not getting a large enough import licence to satisfy the demand. This resulted in a high price increase with the 150 kg drum of caustic soda rising from ₵109 at I.C.I. to ₵300 in the local black market. At certain periods, even though the price was high the commodity could not be found at I.C.I. or in the local market and this adversely affected production schedules. Consequently,

the Centre found it necessary to manufacture its own caustic soda, and in March 1974, a caustic soda plant designed, and constructed at the centre's workshop, and capable of producing 100 kg of caustic soda in 10% solution; was installed at the soap plant. The basic raw materials for the caustic soda manufacture were slaked lime and sodium carbonate (sodium ash). The slaked lime was obtained, almost free of charge from the acetylene plant of L'air Liquide while the soda ash was an imported raw material but relatively cheap on the world market.

Initially, the centre's soapmakers found difficulty in using the 10% caustic solution for soapmaking in accordance with the soap formula being used but after a trial period they mastered the techniques of using the new solution.

2.3 Kwamotech Industries Limited — Kwamo Soap Pilot Plant

By the end of 1974, plans had already been made for the setting up of a soap factory at a village near Kumasi. The purpose of this factory was to produce soap for sale, to serve as a demonstration project showing the technical and commercial viability of the technology, to provide training facilities, and to continue research and development.

With grants from the Ministry of Industries, Oxfam, Québec, and the University, a soap pilot plant was set up at Kwamo a village 8 km from the University on the Kumasi-Accra road. Soap production at the factory started in June 1975 using the electrically heated plant developed at the University. However, in October 1975, an Indian Soap Consultant arrived at the T.C.C. under the sponsorship of the Commonwealth Foundation for a 3 months stay during which he was requested to help improve the quality of the product to match the quality of the popular Key Soap. The Consultant advised the use of a simpler wood-fired soap boiling tank instead of the electrically heated one. A wood-fired plant would be cheaper to run, solve the heater problem, and be more appropriate for use in the rural areas where there was no electricity. Consequently, 3-wood fired tanks were made according to the consultant's specifications and design in December 1975, and at the time of his departure from Ghana in January 1976 all soap produced at Kwamo was done using the wood-fired plants.

Other improvements made by the Consultant in the soap manufacture were:

- a. Foaming of the soap which often occurred in the soap boiling process was avoided by the gradual addition of caustic soda solution.
- b. Local filler — Kaolin — was introduced, and
- c. The centre's soap makers were trained to achieve consistent quality. He also suggested the use of non-edible oil, notably neem oil, for soapmaking as a means of avoiding the competition for edible oil used for human consumption. Soon after the departure of the Consultant, the centre was awarded the Ghana National Standard Board Certificate for its soap product.

For the soap pilot project at Kwamo, 1976 proved to be a year of mixed blessings. Considerable progress was made. The quality of the soap was improved so much that Anchor Soap became very popular in the Kumasi area. Production and sales reached a peak which has not since been equalled. During the same period, prices of commodities started to shoot up with palm oil doubling in price and by the middle of the year, a bar of soap was produced at a cost of C1.05, as against the government controlled price of C0.95. Production and sales records from September 1973 to August 1981 are shown in Appendix 1.

In July 1977, the soap pilot plant at Kwamo was handed over by the T.C.C. to a new company, established by the University Council and named Kwamotech Industries Ltd. The share structure of the company was to have been as follows:

U.S.T.	— 55%
Soapmakers Association	— 25%
Kwamo Stool	— 20%

However, the plant has continued to work with the centre in product and process development, and in the training of soapmakers. The Centre has also remained responsible for the overall direction of day-to-day operations.

CHAPTER 3

EXTENSION OF THE PROJECT

3.1 Sales and installations of soap plants by T.C.C. in Ghana

As already mentioned elsewhere in this report, soap boiling in the rural areas is done in a 200-litre oil drum which has a production capacity of about 80 bars of soap. Together with this low production are the problems involved in the control of the foaming of the soap during the boiling process, the excessive use of firewood and the difficulty in discharging the boiled soap from the drum into moulds.

The use of the Centre's soap plant eliminates all these problems. It is found to increase the production output of soapmakers from 80 bars to 500 bars/day, as well as conserving fuel and providing less difficulty in the control of the foam and the discharging of the soap. To this end, the centre has been constructing soap plants for sale to Ghanaian soap makers who are interested in using such plants.

Interested people come to the office of the centre to place orders for soap plants. Every order is accompanied by the payment of a 50% deposit.

Caustic soda are also constructed for sale to people interested in making their own caustic soda for soap making. Clients are advised of

the difficulty in getting sodium carbonate, one of the two raw materials used in the making of caustic soda, since it is an imported chemical. However the Ministry of Industries looks favourably on the T.C.C. process and recognises that it enables more soap to be produced for a given expenditure of foreign exchange. This facilitates the issue of import licences for sodium carbonate.

3.2 Training and Consultancy Services

To help soapmakers produce good quality soap the centre provides a 3-month training period for people who contact it for the purchase of soap plants. The purpose of this training programme is to ensure that by the end of the training period, would-be soap makers will be conversant with the use of the plants ordered, as well as the production techniques involved in the soap and caustic soda making.

The training, which is free-of-charge, involves the attachment of the trainee to the Soap Pilot Plant at Kwamo to understudy the centre's soapmakers. Trainees are however responsible for their own upkeep during the training period.

After the training, the soap plants are installed at the entrepreneur's factory. One of the Centre's experienced soapmakers is sometimes seconded to the factory for a period of 1-2 months to commission the plants. All relevant technical and commercial information are also made available to the entrepreneur.

The Centre does not only offer training, but also provides consultancy services to entrepreneurs who are already in the soap business, but are finding it difficult to improve the quality of their product. Samples of soaps are received from soapmakers and both chemical and physical analyses of the soap are made to enable the Centre to offer advice on how best the quality of soap can be improved.

3.3 Technology transfer to other West African States

Training, consultancy, services and plant installations have not been confined within the boundaries of Ghana, but have been extended to other West African States.

a. Guinea Bissau

The first country to benefit from this transfer was Guinea Bissau, where the centre was contacted by the Quaker Service of Mali to consult on a Rural Soapmaking project in Bissau, sponsored by the American Friends and Quaker Service.

In this connection the Quaker Services sent 6 would-be soapmakers to Ghana in June 1978 for 2 months training at the Centre's factory at Kwamo. This training programme was followed by an advisory visit by a consultant of the centre's soap project to direct installation of soap plants and production trials. Construction of the plants was made in Bissau with the centre supplying the technical information.

b. Mali

Barely a year after the commissioning of the Guinea Bissau project, the Quaker Service requested the help of the centre for the establishment of another rural soap factory for a woman's co-operative at Markala in Mali.

A short exploratory visit by the T.C.C. soap consultant in February 1979 was followed by another visit in May 1979 to direct the installation of 2 soap plants (built in a workshop at Markala) and to supervise production trials at the new factory.

The Markala soap project has been very successful, and now serves as a centre for diffusion of soap making technologies to other women's groups in Mali.

c. Sierra Leone

In the latter part of 1979, a Sierra Leonean Industrialist, and Director of the Eastern Clinic Rural Development in Mobai, Sierra Leone, Dr. B. M. Kobba, visited the centre and became interested in the centre's soap project. He accordingly requested the services of the centre for the establishment of a similar soap production unit in Mobai.

From T.C.C. designs of soap plants, two soap plants were constructed in the National workshop in Freetown and in June 1980, a T.C.C. Consultant went to Mobai, Sierra Leone, to direct installations and production trails. The Mobai soap project has been very successful and reports from Mobai indicate that the factory must expand to meet local demand for the soap.

d. Togo

At the time of preparation of this case study the T.C.C. was assisting a further rural soapmaking project in Togo.

CHAPTER 4

CASE STUDY

4.1 List of T.C.C. Soap Clients

To date, the Centre has constructed and sold 51 soap boiling tanks and 11 caustic soda plants to 17 entrepreneurs in the six regions of Southern Ghana. The breakdown of the distribution is as follows:

LOCATION		Name of Enterprise Entrepreneur	Date plants Installed	Number of soap plants installed	Number of caustic plants installed
Town	Region				
Kumasi	Ashanti	J. K. K. Aidbo	Sept. 1980	2	1
Kumasi	Ashanti	Mr. E. Alawa	Sept. 1977	3	1
Kumasi	Ashanti	S. Addai	Oct. 1978	1	—
Juaso	Ashanti	Boakye Mensah	Jan. 1981 (Not installed)	3	1
Kumasi	Ashanti	E. Gyase	April 1979	2	—
Kada Koforidua	Eastern Eastern	Obooma Farms Products National Council On Women & Development	April 1980 March 1979	2 4	— 1
Nsawam	Eastern	Amfro Engineering Co.	July 1979	3	1
Nsawam	Eastern	Snow White Ind.	Nov. 1977	3	1
Asamankese	Eastern	Fountain Manuf. Co.	August 1979	2	1
Nkawkaw	Eastern	District Chief Exec.	Oct. 1976	4	—
Sekondi	Western	Pestikal Soap Ent.	Sept. 1975 May 1977	2* 6	— —
Takoradi	Western	Lovable Soap Ind.	July 1977	3	1
Bogoso	Western	Bogoso Oil Mills	Feb. 1980	2	1
Accra	Greater Accra	Grace Dansowa Soap Ent.	Oct. 1978	2	1
Assin Prasu	Central	Kofi Ankrah	Sept. 1977	6	—
Ho	Volta	Sonafa Co. Ltd	Jan. 1975	1*	1

* Electrically operated plants

4.2 Case Histories

A visit made to some of the Centre's clients revealed some interesting situations. A detailed report of these case histories is given in Appendix 2 of this report.

Visits were made to clients in the Western, Greater Accra, Central, Eastern, Volta and the Ashanti regions, and the case histories of these clients revealed that the establishment of a small scale soap industry in Ghana has to be counted a success for intermediate technology. Though most entrepreneurs find the future of the industry somewhat uncertain, they attribute this situation to the state of the economy rather than to any fault in the technology or its transfer. They see the technology satisfying all the criteria by which one might judge an Intermediate Technology venture; the plants are small scale, employing a work force of between 3 and 20, the process used is simple and can be learnt after a short training period, the product is readily accepted on the local market, the amount of organisation and supervision, although important, is not excessive, and the capital cost is low and well within the capacity of the small entrepreneur.

Cost analyses made on the operations of the clients show that profitability has been low, partly due to rapid inflation in the raw material costs which has not been matched by increases in the controlled selling price of soap. It is also due partly to shortage of raw material which has held production at very low levels relative to production capacity and has forced some entrepreneurs to halt production. In all these case histories, one thing stands out — that before an industry can be established, its raw material supply must be assured, preferably from local sources. This consideration has persuaded many entrepreneurs to establish oil palm plantations and oil mills to feed their soap projects.

CHAPTER 5

PROBLEM DISCUSSIONS AND ATTEMPTED SOLUTIONS

5.1 Raw Materials

As already mentioned, the greatest problem facing the soap industry is the shortage and high cost of raw materials namely, palm oil, caustic soda and perfume, on the local market.

(a) *Palm oil*: The high cost of palm oil continues to pose a big threat to the soap industry in Ghana. In 1973, when the project started, a 200 litre drum of palm oil was selling at ₵95.00. As the years passed by the price

increased to reach a level of ₦3,000 per drum by the fall of 1980, even though the controlled price for a bar of soap has only increased from ₦0.95 to ₦4.50 over the same period. The high cost of palm oil has been due to market forces as the demand for the oil far exceeds the supply.

To improve the oil supply position the centre is making efforts to find a solution from three points of view, namely, short-term, medium term and long-term.

In the short-term, attempts are being made by the centre to encourage farmers and soapmakers to produce more oil at a relatively low cost. In accordance with this objective, the centre has designed and constructed a hand screw press for sale to farmers in the rural areas where there are plenty of palm fruits. The press which is simple in its design and operation has generated a lot of interest in farmers, and to date, a total number of about 50 presses has been sold. It is hoped that with the introduction of this press in the rural areas, there will be an increase in the palm oil supply locally available.

In the medium term, the Centre has for some time been involved in finding local plants whose seeds can produce oils suitable for soapmaking at a lower cost. The research has so far covered oils extracted from several local plants, namely, castor, physic nut, monkey cola and neem. Oils extracted from the seeds of these plants have been used in making soap on an experimental basis.

The findings are summarised below:

Oil	Soap Making Potential	Availability
Neem	Makes good soap, unblended	Available locally, but not in commercial quantities. Fruiting starts 4-5 yrs. after planting
Physic Nut	Produces good lather but very soft soap.	Available locally but not in commercial quantities. Fruiting takes 6-12 months after planting
Castor	Produces poor lather but very hard soap can be blended with physic nut oil to produce good soap	Available locally but not in commercial quantities. Fruiting takes 5-6 months after planting.

Monkey Cola Makes soft soap, might be useful for blending

Available but not in commercial quantities. Fruiting takes 5-6 yrs. after planting

Though the neem oil was found to be outstanding among the other oils in soapmaking, the collection cost of the fruits has proved very expensive. Its period for planting to fruiting does not make it suitable for a medium term solution.

The above findings reveal that a castor and physic oil blend in the right proportions may be very suitable for good soap-making. The fruiting periods of these plants also makes them very suitable for meeting the medium term objectives. In view of this the centre has cultivated 5½ acres of castor and physic nut farm at Kwamo to place it in a better position to further investigate the possibilities of the castor and physic nut blend for soapmaking on a commercial scale. Recently the use of castor oil has been taken up by Ghana's largest soap producer; Lever Brothers Ghana Ltd. Both the small soap entrepreneurs and Lever Brothers Ghana Ltd. have found the need to be self reliant in raw material supply and have expressed a lot of interest in the T.C.C. non-edible oil project. Lever Brothers are planning to set up their castor oil plantation for the production of castor oil for soapmaking.

In the long term, the centre has directed its efforts towards encouraging more local farmers to go into the cultivation of oil palm, as oil palm cultivation is now about 3 times more profitable per acre than cocoa.

In this respect the centre has assisted groups of farmers to combine in group farming and co-operative schemes, and has drawn up feasibility studies and projected cash flows for oil palm plantations. The banks have been found to be more ready to provide funds to farmers who have sought professional advice for their projects. The Centre has also helped to provide loans for small farmers from a rotating loan fund established by the Scottish War on Want.

(b) *Caustic Soda*: Caustic Soda is another raw material that is scarce and expensive on the local market. At the beginning of the T.C.C. soap project in 1973, a kilogram of caustic soda was selling at ₵2.00. This price has gone up over the years to ₵20/kg by the end of 1980. The T.C.C. began to construct and operate a caustic soda plant in 1974. Though the plant has been commercialised, and about 11 caustic soda plants have been sold to entrepreneurs, this has made only a small contribution towards solving the caustic soda scarcity. One of the raw materials used in the caustic soda manufacture is sodium carbonate, and

this is an imported raw material which is also often scarce on the local market. This has forced many clients who have no import licence to halt production. The Centre is making all efforts to advise the Government to import more of this chemical instead of caustic soda since the Government saves about half the foreign exchange on the importation of sodium carbonate as compared with the importation of caustic soda. The Centre is also working with some departments of the University on the small scale local manufacture of caustic soda from the electrolysis of brine.

(c) Perfumé: Another problem which is faced by the soap industry in Ghana is the reliance of the industry on the use of imported perfume. Perfume has been, and still is, very scarce and expensive on the local market. However, this has not hindered local soapmakers from supplying the market with unscented soaps which have a ready market because of scarcity of soap generally. However if the small scale soap makers are to continue to capture a greater part of the market, it will be imperative that they produce soap with a pleasant scent.

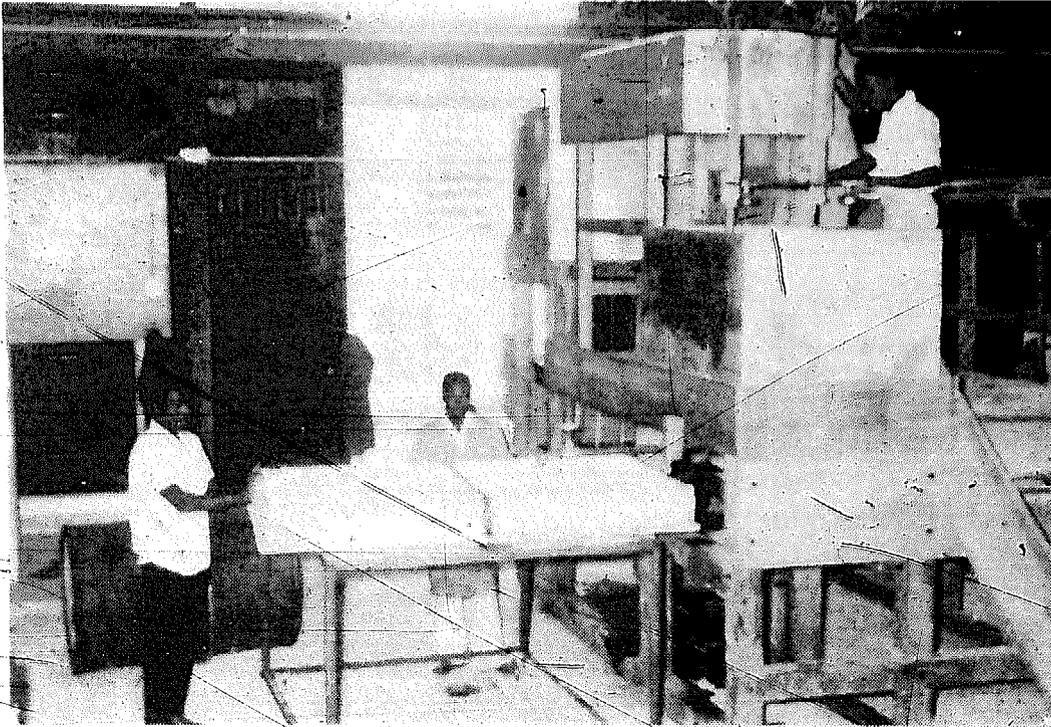
It is for this reason that the centre has adopted and developed a perfume extractor plant capable of being operated by unskilled labour in the rural areas. The plant is capable of processing about 100kg of lemon grass per day, yielding 300gms. of perfume. The plant is still in the development stage and has not been commercialised. However the idea has now been adopted and further developed by Lever Brothers Ghana Ltd.

5.2 Funding

The entrepreneur starting a soap business needs money to buy raw materials and soapmaking equipments and to run the plant as well as to pay salaries. Most entrepreneurs do not seem to have difficulty in raising funds from their own resources for the initial running of the project. However as the project expands, the need for a bank loan becomes felt as most entrepreneurs do not plough back their initial profits. On several occasions, the Centre has been approached by entrepreneurs to help them obtain bank loans. The Centre on the other hand believes that if the project is well managed and profits well utilised, entrepreneurs should be in a position to finance their expansion programmes from their own resources. A serious entrepreneur is one who is prepared to take risk with his own resources! This counsel is often given to clients but help is also given in the raising of bank loans where appropriate.

5.3 Management and Supervision

The studies have also shown that some entrepreneurs have been unsuccessful in their ventures because of lack of management and



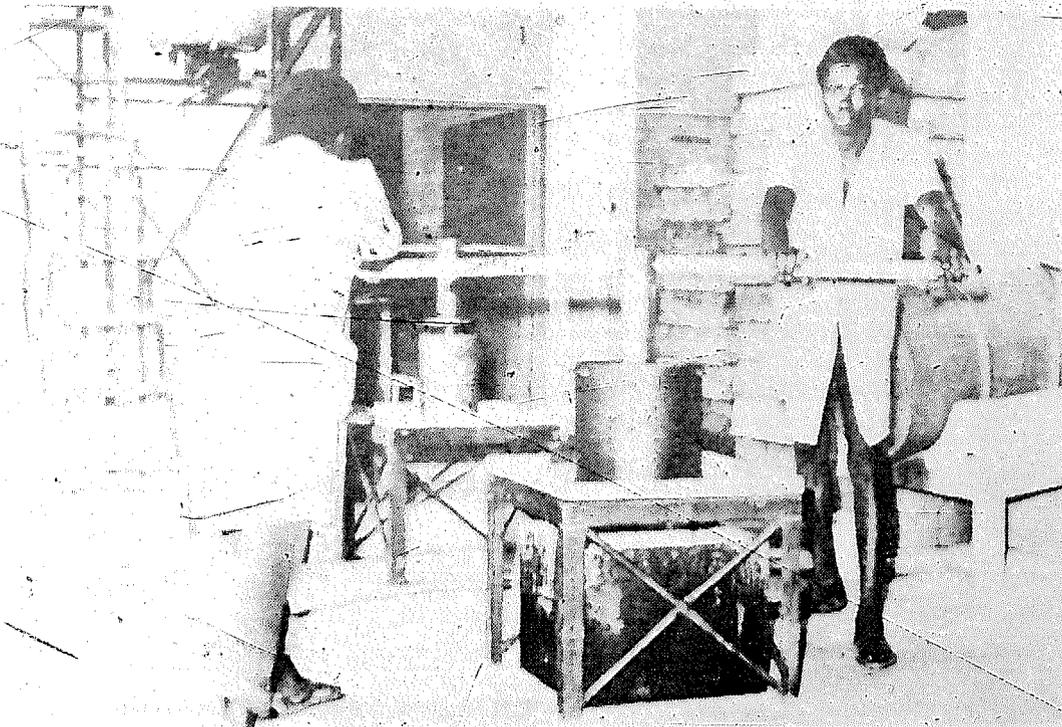
Soap production began at the TCC Campus Workshop in September 1973. Here the original electric plant is seen just prior to start up.



Cutting and packing soap at the TCC Campus Workshop in 1974. Mr. D. K. Forson, General Manager of the Pilot Plant, is seen standing in the background.



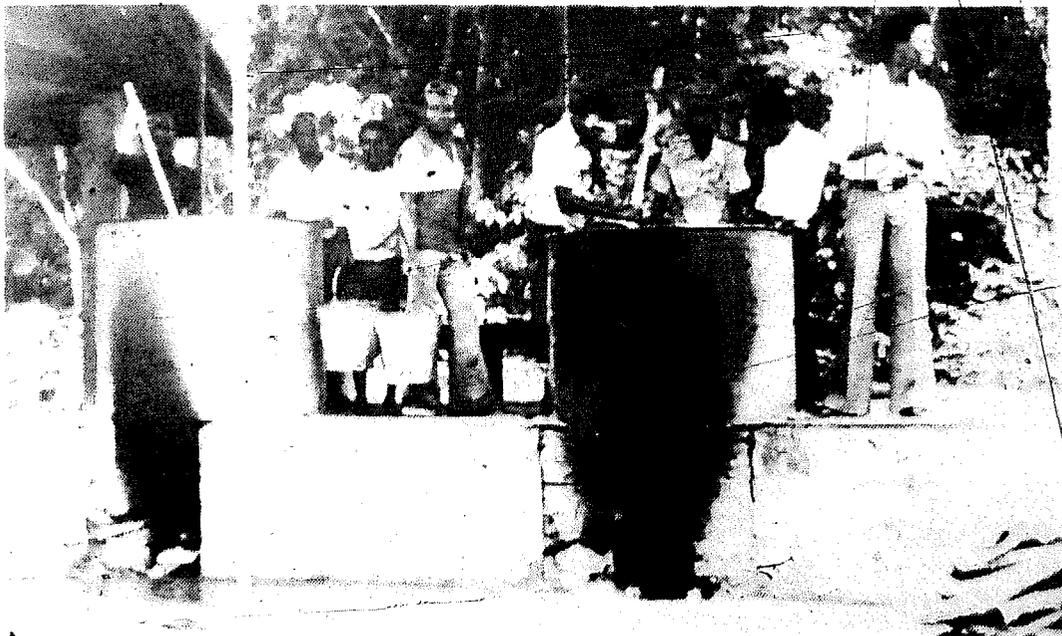
Soap making at the Soap Pilot Plant, Kwamo, Ashanti, by the wood-fired method. This technique was adopted early in 1976 after the visit of Sri G. Prakash from India.



Extraction of palm oil using the TCC's press seen here undergoing initial testing in 1977 at the Soap Pilot Plant, Kwamo.



Technology transfer in Mali. Mr. Peter Donkor, Research Fellow, standing on the right, taught the TCC's techniques to a women's co-operative.



Technology transfer in Sierra Leone. Here also, as in Guinea Bissan and Togo, Peter Donkor found that the TCC had an 'appropriate technology' to offer.

supervision. A case is reported of an entrepreneur who had his factory set ablaze as a result of overboiling and igniting of bleached palm oil. On another occasion, he distributed a batch of very poor quality soap to customers in Accra and was not able to refund the customers' money when the soap was rejected and returned to the factory. This forced him to finally wind up the business. Both these situations were found to have been due to poor management and supervision. Good organisation, operation, supervision and control of small scale industry are always taken for granted by most small scale entrepreneurs, yet these management skills contribute enormously to the successful running of an enterprise, be it small or large.

Short duration courses occasionally run by the Ghana Management Development and Productivity Institute to broaden the management skills of small scale entrepreneurs are recommended by the T.C.C. Good technology transfer, availability of raw materials and ready markets for the products must be coupled with good management for any successful venture.

CHAPTER 6

CONCLUSION

In any technology transfer aimed at upgrading existing craft industries by the introduction of improved manufacturing techniques, it is necessary to identify the features that will account for the success of such a transfer. With the Centre's soap technology, the following are found to be the determining factors towards the successful transfer of the technology:

- i. the manufacturing technique developed by the centre was made simple.
- ii. raw materials used for the soapmaking are locally obtained and people are already used to working with them.
- iii. the product is a basic consumption item needed in every home
- iv. the financial return of the project is high enough to attract entrepreneurs.

Considerable attention was also given to the setting up of the following services to the soapmakers which have gone a long way to ensure the success of the project,

- the establishment of a soap pilot plant, which could demonstrate the technical and commercial viability of the project

- the setting up of a workshop where soap plants were made, experiments carried out, and plants made to order for sale to the entrepreneurs.
- the offering of technical services to the entrepreneurs before, during and after installation of soap plants
- and the advice of a consultant in soapmaking, which has resulted in significant improvements in product and process.

The Centre's soap project has come to stay and has contributed significantly towards the production and supply of locally made soap in Ghana and the other West African States:

As more research work continues to be done on process development, production techniques and raw material supply, it is hoped that more soap entrepreneurs will come to enjoy the good services of the Centre.

LIST OF REFERENCES

- Intermediate Technology in Ghana — the experience of the T.C.C. by Sally Holtermann
- Finding an Economic Non-Edible Oil Substitute (for palm oil) for Soapmaking with particular interest in the Neem Oil by Peter Donkor
- The Development and Transfer of an Intermediate Technology for the Small Scale Soap Industry of Ghana by Peter Donkor
- T.C.C. Annual Reviews Nos. 2, 3, 4
- Appropriate Technology Vol. 7 No. 3, December 1980

APPENDIX 1

SOAP PILOT PLANT

PRODUCTION OF SALES RECORD (SEPTEMBER 1973 - AUGUST 1980)

Year of Project	Period	Production (Cartons) OF 15 KG	Sales (¢)
1.	Sept '73 - Aug. '74	2674	27,804.30
2.	Sept '74 - Aug. '75	3635	51,825.70
3.	Sept '75 - Aug. '76	6768	98,408.65
4.	Sept '76 - Aug. '77	2048	44,646.11
5.	Sept '77 - Aug. '78	2096	119,439.00
6.	Sept '78 - Aug. '79	2017	261,411.00
7.	Sept '79 - Aug. '80	3051	450,377.00
8.	Sept '80 - Aug. '81	4406	1,117,381.00

APPENDIX 2

CASE HISTORIES OF SOME OF THE T.C.C. CLIENTS

All the figures used in the case histories for the cost of raw materials and labour were figures existing at the time of the survey in January 1980.

1. FOUNTAIN MANUFACTURING COMPANY (ASAMANKESE)

The company is a private soapmaking enterprise, owned by Mr. Abboa Offei and Brothers at Asamankese in the Eastern Region.

After successful attempts to produce toilet soap in early 1977, he introduced the production of liquid soap in early 1979, and by the middle of the year he had obtained the Ghana National Standard Board's Certificate for both the toilet and the liquid soaps. Production of the products continued steadily until November 1979, when the company started making losses when coconut oil and palm kernel oil became scarce and very expensive.

During this period, they learnt of the Centre's soapmaking project, and a visit made to the Centre convinced them to start pale bar soap production, and accordingly an order for one caustic soda and two soap plants were made with the Centre, and these were installed at the factory at Asamankese on October 1979. To get production started, an experienced soapmaker from the Centre was second to the company for a period of one month.

Production: Production of soap soon started after the installation and, due to the high demand of soap in the area, production of caustic soda and soap was made 6 days a week. The excessive use of the caustic soda plant resulted in the break down of the plant, two months after the installation. Caustic soda was made at the factory at the production cost of ₵9.50/kg, using the T.C.C. plant, as compared with the market price of ₵24.00/kg.

Raw materials: The factory's raw materials, namely, slaked lime, sodium carbonate, perfume and kaolin were all obtained from Accra except the palm oil which was bought from Kusi near Asamankesse.

Palm oil was bought at ₵3,080.00 per 200 litre drum, sodium carbonate at ₵300/50kg, kaolin at ₵50/kg bag and slaked lime obtained free of charge except for transportation cost of ₵500.00 per month.

ii. *Product:* The factory produced 70 cartons of pale soap a day under the trade name of "Fountain Soap". The soap was soft, and chemical analysis revealed that it contained 53% of water by weight (as against the Standard Board requirement of 30%). Customers complained about the softness, however there was very little the factory could do to improve upon it as any attempt would have made them incur losses due to high cost of raw materials. Demand for the soap exceeded the supply as soap was scarce. Production cost for a carton of soap was ₵58.00 and the selling price was ₵60.00.

iii. *Work force:* Up to the time of writing this report in January 1980, a total amount of ₵200,000 had been invested in the soap factory and an oil palm plantation, from the company's own resources. However, a loan of ₵5 million was being sought from its bankers for importation of raw materials, establishment of a palm oil mill, and a setting up of a big soap complex.

Even though the company was found to be operating at a profit, the following difficulties were found to be the company's main setback:

1. Non-availability, and high cost of raw materials which was forcing the company to produce poor quality soap
2. High rate of labour turn over, as they could not compete with a new oil palm project in the area which was paying higher salaries to labourers
3. Lack of sufficient capital for expansion.

However the company was of the opinion that the T.C.C. involvement with the supply of soap and caustic soda plants was a big advantage over

the use of the 200-litre drum previously used for soap boiling. The company admitted that the T.C.C. plant offered a reduction of risk in the soap boiling process, an increase in the quantity of soap which could be produced per day, if raw materials were available, less labour requirement, lower fuel use, and durability of plants.

On the other hand the company felt that this technology and its transfer by the Centre would be more appropriate if the following steps could be taken by the Centre:

- a. Make more research into local production of imported raw materials for soapmaking.
- b. Send a soap consultant around every year to discuss with the Centre's clients how best they could run their projects successfully.
- c. Encourage people to grow more oil palm, and advise the Government to import sodium carbonate instead of caustic soda, for the production of cheaper caustic soda using T.C.C. plants.

Conclusion

The company owes its success to the serious and good management of Mr. Abboa Offei, the Managing Director who has worked vigorously by trial and error to put the enterprise on a sound economic footing. Through Radio and TV adverts, the factory has become very well known in the Asamankese district. Its expansion programme is very welcome.

2. PESTIKAL SOAP ENTERPRISE (KETAN-SEKONDI)

The Pestikal Soap Enterprise was privately owned by Mr. Marfo, a poultry farmer who, with production problems, sold all his birds and invested his revenue in soapmaking.

His project started early in 1975, when he consulted the Centre to help him establish a soapmaking enterprise in Sekondi, in the Western Region.

Accordingly, two electrically operated soap boiling tanks were installed for Mr. Marfo in Sekondi in mid May, after 3 months successful training of 2 men sent by him had been completed at the Centre's soap factory. Soon after the installation of the plants, one experienced soapmaker from the T.C.C. was seconded to the factory for one month to get production started. Orders began to flow from various establishments from Sekondi/Takoradi, as soap was scarce at the time of production. As his working capital was not enough, Mr. Marfo started collecting advance payments for orders from his customers.

Production

Production continued steadily, until early 1976, when trouble started. As profits were made, Mr. Marfo paid little attention to his workers. The late coming of salaries coupled with poor supervision compelled the

workers to relax in the execution of their duties. This situation continued until one day the factory was set on fire when palm oil being bleached by the workers was left unattended until it caught fire. The damage to the rented building housing the factory was great and consequently, Mr. Marfo was evicted from the building by the landlord; thus ending his one year soapmaking business.

After recovering from this setback, the burnt soap tanks were renovated and sold to a soapmaker in Takoradi. However, determined to go on with the soap business, Mr. Marfo established a new soap production unit at Ketan, near Sekondi in June 1977, with six wood-fired soap tanks sold to him by the T.C.C., and soap production started again.

Meanwhile, he contacted his old customers and won new ones for more orders. Again with little working capital and more orders, he could not avoid collecting advance payments for orders.

i. *Raw Materials*

Raw materials were bought from the Takoradi market. Palm oil was bought at ₵800/drum, and ₵400/drum for sludge oil, caustic soda at ₵600/180kg drum and kaolin at ₵12/50kg drum. Transport bill per month was ₵500 and firewood was bought from farmers at ₵100/tonne.

ii. *Product*

The factory was producing bar soap under the trade mark of 'PALM'. Production was made 5 days a week with a daily production of 120 cartons of soap. The soap was however not of a good quality as workers employed at the new factory were all new hands with little or no experience in soapmaking.

Production cost of a carton of soap was ₵39.17 using edible oil, and ₵22.67 using sludge oil, and the selling price was ₵48/carton, thus making a daily profit of ₵1,059 using edible oil and ₵3,039 using sludge oil.

iii. *Work Force*

The factory had a work force of 21 and paid an average salary of ₵140.00. The workers did not enjoy any incentive except for a half bar of soap per worker per week.

Problems

The factory's problems can be discussed under 3 headings, namely Financial, Labour turnover and Supervision.

Though the factory had very little working capital and was relying on advance payments for its operation, huge profits were being made, and the ploughing back of these profits would have put the company on a good financial footing. However, the profits were used on other items unconnected with the soap project.

Secondly, after dismissing his trained workers, he employed new hands to run the new factory, and as these people did not have any experience in soapmaking, very poor quality soap was produced, resulting in the loss of some of his potential customers. Apparently, he preferred paying lower salaries to the new workers to paying higher salaries to the old ones. Thirdly, the management of the factory became a one man affair with Mr. Marfo assuming every post. This resulted in poor supervision, as he was away very often to transact business in connection with the project.

The effect of these problems soon showed up six months after the commissioning of the plants. That was in November 1977, when a very poor quality soap was produced for a customer in Accra who had placed an order of 200 cartons of soap, and had made more than 50% advance payment for the order. Two weeks after the delivery of this soap, all the 200 cartons of soap was returned. An attempt by the factory to reclaim the soap was unsuccessful, as the sludge oil used for the making of the soap was not well bleached and clarified, resulting in the soap having a horrible odour and colour. Mr. Marfo was forced to sell the soap at ₵5/carton, and was indebted to the tune of ₵8,600.

Meanwhile, he made successful attempts to refund the customer's money from short-term loans, and the factory was finally closed down as there was no money to run it. The soap boiling tanks were then depreciated and sold to settle some of the debts, thus ending his second attempt to produce soap.

Conclusion

The company's case has been a sad one indeed. The story clearly indicates absolute lack of seriousness in the management of the soap project. Marfo's main setback was his desire to collect monies from customers long before the supply of the product ordered. In some cases customers who had already made advance payments never got their supplies.

3. GRACE DANSOWAA SOAP AND COSMETICS (ACCRA)

The Company, which was established in Accra in 1962 to manufacture pomade, is privately owned by Madam Grace Dansowaa. Three years after the setting up of the company, it decided to go into the manufacture of toilet soap after purchasing a toilet soapmaking machine from Atico Ltd., a toilet soap making Company in Accra.

Late in 1975, after a successful operation of toilet soapmaking, the company decided to include laundry soap in its range of products, and subsequently approached the Centre for assistance. An order for two soap boiling tanks was made, and early in 1976, the tanks were installed at the Company's workshop in Accra.

Production

After a year of operation in laundry soap production, the Company's orders from its customers exceeded its supply, and the need for an increase in production output became necessary. Accordingly, two 4,500 litre boiling tanks of T.C.C. design were made for the company at a metal workshop in Accra and installed at the factory in early 1977. This increased the production output of 60 cartons per day to 250 cartons per day, and production was made five days a week.

i. Raw Materials

The Company operated a small oil mill for the extraction of palm and coconut oils from palm fruits obtained from the company's 50 acre oil palm plantation at Fosu and copra bought from Esiama in the Western Region. The coconut oil was used for toilet soapmaking, while the palm oil was used for laundry soap. The Company produced a drum of palm oil at ₵1,500, while a drum of palm oil was bought from the State Farms, Takoradi at ₵1,850, during the lean season.

Other raw materials were bought from the local market at the following prices: Caustic Soda at ₵10,000/400kg drum, perfume at ₵700/gallon and coconut oil at ₵1,720 during the lean season.

ii. Product

The soap was produced under the trade name of 'Arrow'. The Company produced a carton of soap at ₵46.40, and sold the same quantity at ₵48.86, thus making a profit of ₵2.46 on a carton, or ₵615.00 a day. The soap was however found to be very soft, even though the company operated under Ghana Standard Board Certificate. Customers complained about the softness of the soap, but no attempt was made to increase the hardness as the cost of raw material was very high, and would result in the company making losses.

iii. Work Force

The Company had a total work force of 13 with labourers earning average salary of ₵150 per month. Workers received annual bonus, and a bar of soap every month.

Problems and Expansion

The Company did not seem to have many problems except for the scarcity of perfume, and the high cost of caustic soda at the local market. Attempts were being made to have these raw materials imported at a lower cost.

A new set up to produce soap on a large scale had been planned, and a permanent buildings for this purpose had been put up in Accra. Coconut oil extraction machines had been ordered to increase its coconut oil production for toilet soap production. This expansion programme was to be carried out by self financing, and a bank loan.

T.C.C. Involvement

The Company finds the Centre's equipments, very durable and appropriate to their present level of production, but suggests that the soap making process be made less labour intensive, especially, with the stirring and cutting of the soap. It also suggested regular follow-up visits to the Centre's clients by soap experts from the Centre for a meaningful technology transfer.

Conclusion

Starting business as a pomade maker, Madam Dansowaa has displayed a lot of seriousness to become one of the very successful small scale soapmakers in Accra. The establishment of a 50 acre oil palm plantation and the extraction of coconut oil to feed the soap factory have been big assets. Her plan to establish a big soap complex is welcome, especially if financing could be done largely from the company's own resources.

4. THE SONAFA COMPANY LTD. HO

This Company is a privately owned limited liability Company established in October 1974 to manufacture chemicals and soap which was scarce at Ho and its surrounding villages.

The soap project was the brain child of Dr. Sodzi a lecturer at UST, and one of the share holders of the company who approached the Centre in late 1974 for help to establish a rural soap factory at Ho. Being the first of its kind to be established by the Centre for a local soap maker, the T.C.C. became very interested in the ideas as it was an opportunity to transfer its developed soap technology to the rural areas.

Accordingly, on the advice of the Centre, the company placed an order of one electrically heated 250 bar — capacity soap boiling tank, and a caustic soda plant and these were installed at the factory site at Ho in January 1975. To get the project started, the company was supplied with one drum of imported perfume, 10 (50kg) bags of sodium carbonate, and one experienced soapmaker from the Centre.

Production

Soap production started soon after the installation with oil supplies from Dzodze, near Ho, soda ash from various sources in Accra, and slaked lime from Tema. A factory manager, trained at the Centre's soap factory, assisted by 2 labourers were employed to do the production.

During production peaks, the company produced 13 cartons a day, and the soap was sold under the trade name "VICTORY SOAP". To improve the quality of the product and maintain standards, regular analysis of the soap was done at the Ho Mawuli Sec. School. Marketing of the soap was a problem during the first few months of production but people soon became familiar with the soap and demand exceeded supply. However, at the selling price of ₵20.00 a carton in 1975, the company could only make losses and occasionally break even.

Problems

Barely after a year's operation, the company found it difficult to get palm oil and sodium carbonate supplies. The Dzodze oil mill had virtually stopped production. Production of soap fell considerably and by the first half of 1976 it was obvious that the factory could not operate under the prevailing conditions, and the factory was closed down.

T.C.C. Involvement

Though the company found the Centre's soap technology and its transfer very appropriate it felt that the Centre should play a leading role to help its soap clients in getting support from the government in a form of tax exemption for a period of 5 years as well as the procurement of imported raw materials for the clients.

Conclusion

This report was based on information obtained from Dr. Sodzi on a questionnaire sent to him. The staff conducting this study could not visit the factory at Ho due to technical difficulties. Since figures were not supplied on the cost of raw materials and labour, it was difficult to know whether the project was unsuccessful because of the non availability and high cost of raw materials, or poor management.

It is sad to learn how a company could invest a total amount of ₵13,542.27 as at April 1975 and be forced out of operation just after a years production. This shows that in any rural production unit, some of the factors affecting the siting of the unit, e.g. factory proximity to raw material source, must be thoroughly studied. Though the company did not have any problems with the marketing of the products, it could probably not afford to travel to other regions to purchase raw materials, notably palm oil, when the Dzodze palm oil mill, the only source of oil supply to the factory was closed down.

5. AMFRO SOAP ENTERPRISE (NSAWAM)

The Amfro Soap Enterprise at Nsawam is solely owned by Mr. Michael Kofi Attipoe, who runs the Amfro Engineering Company in Accra.

In July 1979, Mr. Attipoe decided to set up a rural soap and cosmetic production unit and accordingly placed an order with the T.C.C. for three wood-fired soap boiling tanks and one caustic soda plant. These plants were delivered for installation in October 1979 at the Nswama factory. Meanwhile, an experienced soap maker trained by the T.C.C. for an Indian soap maker at Nswam was employed as the Production Manager of the new factory.

The soap and caustic soda plants were commissioned soon after the installation and soap was produced 5 days in a week while caustic soda was produced once every 4 days.

Raw Materials

Raw materials were all purchased from the local market at ₵2,530 per drum of palm oil, ₵565 per 50kg bag of sodium carbonate, ₵50 per 50kg bag of kaolin, and ₵150 per tonne of firewood. Water was costing ₵0.10 per gallon, and electricity charges was ₵176/month.

Product

The factory produced 60 cartons of soap a day and the soap was sold in Accra under no trade name. The soap, which had no Standard Board Certificate, was soft. However there was ready market for it due to the scarcity of soap.

The production cost for a carton of soap was ₵48.17 and the selling price for a carton was ₵52.50.

Labour Force

The factory had a labour force of five, made up of a production manager of 4 labourers. Workers are given a free bar of soap every week as an incentive.

Problems

The major problem facing the factory was the scarcity and high cost of palm oil and sodium carbonate for the making of caustic soda.

Future Plans

The company was planning to install 3 more of the Centre's soap boiling plants as a short term measure to increase soap production. A diversification of product was being planned to include toilet soap production. Automatic stamping and wrapping machines had already been imported from Italy for the purpose.

The financing of this expansion programme would be by a loan from the bank.

T.C.C. Involvement — Advantages and Disadvantages

Mr. Attipoe was of the view that the Centre's involvement had been a great help to him as the setting up of the factory was made possible by the Centre's readiness to supply soapmaking equipments which had been very appropriate to their scale of operation. He however suggested the redesign of the soap boiling tank to make its operation less labour intensive.

Conclusion

Even though the establishment of the Amfro Soap Enterprise was only 3 months old at the time of the survey, there was every indication that the enterprise would be a success, judging from their scale of operation. However the need to improve the quality of their product is a necessary factor for the successful operation of the enterprise.

6. LOVABLE SOAP INDUSTRY (TAKORADI)

The Lovable Soap Industry is owned by Mr. Ntow, a hardware and textile trader of Takoradi.

After some years of successful operation of trading business, Mr. Ntow found the need to establish a small soap production unit in Takoradi as soap was scarce in the area but palm oil was easily available at the Takoradi State Farms.

Accordingly, upon the advise of the Centre, he placed an order for 3 wood-fired soap boiling tanks and a caustic soda plant. Meanwhile 2 boys were sponsored by him to be trained at the Centre in soapmaking techniques. The plants were installed in Mr. Ntow's house at Takoradi in the middle of 1977.

Production

Soon after the installation of the plants an experienced soap maker from the Centre was seconded to the factory for one month and soon production started.

Soap production was done 5 days a week and caustic soda was made every other day. After some few months of operation, the factory found it more convenient to use firewood instead of electricity for the boiling of the caustic soda. The electrically heated caustic soda plant was successfully converted into a wood-fired plant by Mr. Ntow.

Six months after the establishment of the factory, it was approved by the Ministry of Industries, and the Ghana Standard Board issued it with a Certificate after a quality test had been made on its product.

Meanwhile the factory's name was put on the State Farms allocation list for the allocation of 30 drums of palm oil a month. An Import

Licence for the importation of perfume and sodium carbonate was granted to the industry and this was rightly utilised. This enabled production to be continuous for about a year (June 1978 to May 1979), after which production slackened due to non-availability of soda ash for caustic soda manufacture. However, 150 bags of sodium carbonate imported from Britain and 150 drums of palm oil imported from Ivory coast arrived at the factory in December 1979. The arrival of the carbonate was more of a blow than a relief as it could not be used to manufacture a 10% caustic soda solution suitable for soapmaking. Caustic solution obtained from the use of the carbonate was found to be too weak for soapmaking. Samples of the carbonate were therefore tested to the UST and found to be sodium bicarbonate. Mr. Ntow was accordingly advised on how to use this material for caustic soda manufacture.

Raw Materials

Palm oil was bought at the State Farms at ₵1,550 per drum or imported from Ivory Coast at ₵700 per drum, sodium hydroxide was prepared at the factory at ₵2.80 per kg., perfume was imported at ₵1,200 per drum and kaoline was bought from Tarkwa at ₵40/50kg bag.

Product

The factory produced 50 cartons of soap a day under the trade name LOVABLE SOAP. The production cost for a carton of soap was ₵46.50 and the selling price was ₵60.00.

Labour Force

The factory which is managed by Mr. Ntow, has a labour force of 4, made up of a supervisor, two labourers and a driver. Even though there had been a lot of theft cases involving the supervisor (who was once caught sending a truck load of soap to town in the night by Mr. Ntow) and some of the workers, Mr. Ntow did not see the need for a watchman.

Workers are given 2 free bars of soap every week and a carton of soap every month when production was in full swing.

Problems

The factory did not seem to have many problems with raw materials, except on occasions when its imported raw materials were exhausted, forcing the factory to close down temporary. At the time of writing this report a big consignment of caustic soda, palm oil and sodium carbonate ordered by the factory were being expected to arrive in Ghana.

Future Plans

The industry was planning to embark on large scale production of soap with soap plants and equipment imported from Italy. Meanwhile,

the industry had put up a new permanent factory building to house the new soap plants for the production of toilet and laundry soap. Up to the time of this study, the industry had invested an amount of C25,000 in the soap business from its own resources. It was also planning to establish an oil palm plantation and an oil mill in the near future to feed the new set up. This would be financed partly from a bank loan and partly from the industry's own resources.

T.C.C. Involvement — Advantages and Disadvantages

Mr. Ntow looked at the Centre's involvement as a big asset, as it had opened his awareness in the soap making business and the management of a small scale production unit. He found the technology to be very appropriate to a small scale soap enterprise, but suggested the following for a meaningful transfer of the technology:

1. The Centre should decentralise its training programme by encouraging District Councils and Town Development Committees to set up soap production units where the training could be done by the Centre's experienced soapmakers.
2. Local metal workshops should be encouraged to take up the construction and repairs of the T.C.C. soap and caustic soda plants for would-be soapmakers.
3. The technology should be made less labour intensive.

Conclusion

The Industry has been one of the very few successful soap projects set up by the Centre for a soap entrepreneur. Although the factory had suffered some technical problems, it has managed to solve these problems to find the need for expansion. The industry owes its success to the good management and seriousness on the part of Mr. Ntow. His plans to establish a big soap complex is encouraging; and the Centres involvement has at least put the industry one step forward.

7. THE WOMENS SOAP CO-OPERATIVE (MARKALA, MALI)

The Markala womens co-operative in Mali was founded in 1975 by a group of women who wanted to work as a co-operative to generate some income for their families. Soon after the formation of the co-operative, members started the collection of firewood, cloth dyeing, and extraction of fish oil, for sale. Cloth dyeing finally became the principal revenue base for the group. Profit margins were however very low due to the high cost of raw materials and the labour intensive technology used. Hoping

to increase their range of income producing activities, they began to experiment with different techniques of soapmaking.

First Attempt of Soapmaking

After being introduced to a cold process soapmaking techniques by a Malian soapmaker, the women made attempts to improve on the local soap production which involved the use of local caustic potash and oils. Soon the women experimented with both fish oil and shea butter for cold process soapmaking. The fish oil was found to produce soft soap which lathered very well while the shea butter produced relatively hard soap with little lather. Both oils were also found to produce soap with unpleasant odour due to the process used. Profits were therefore made only during periods of acute shortage of soap. Nevertheless, the process gave the group the basic knowledge of soapmaking using caustic soda.

T.C.C. Involvement in the Soap Project

In February 1979, at the request of the cooperative a T.C.C. soap consultant visited Markala under the sponsorship of the Quaker Service Office in Mali, to study and advise the possibilities of improving the local soap being produced. During the visit, the women were introduced to the boiling process of soapmaking (which was an unknown process to soapmakers in Mali) using different combinations of shea butter and fish oil as well as shea butter and peanut oil. Satisfied with the high quality of soap produced, and the estimated profitability using the boiling process the Quaker Service and the Co-op. decided to set up a rural soap factory based on the T.C.C. model. Accordingly, the design of the soap boiling tank was given to the Co-op. by the Centre for construction at a local workshop in Markala.

Installation and Production trials

Soon after the construction of two soap boiling tanks, the Centre's consultant made a second visit to Markala to direct the installation of the soap plants and get the soap production started. The total cost of the two plants and their installation was 505,380 malian francs*.

After the installation, the consultant stayed for one week working with the women and teaching them the basic techniques of soapmaking using the boiling process. A total of 2 tonnes of soap was produced during the period.

* 969FM = £1 sterling, August 1980

Development and Problems

Over the months that followed the setting up of the unit by the T.C.C., the women continued to experiment with various oil blends, fire intensity, timing of water additions, and the use of different fillers, and successfully produced a laundry soap which compared favourably in quality and appearance with any industrially produced soap sold in Mali.

The technical aspects of the soap production had been mastered and local demand for the soap met. However a number of obstacles remained before the group could attain its goal of the production of 2,000 bars of soap a week. To attain this goal, the group had to set up retail agents in other Malian towns. This would also mean a good book-keeping system which would require the training of the two literate women in the group, keeping up written records of all the undertakings of the Co-op.

Conclusion

Since the setting up of the soap production unit women from other regions of Mali have shown considerable interest in learning the new soap making technology. In January 1980 the Markala Co-op. trained 15 representatives from nine rural woman groups, in soapmaking. The Markala unit is thus serving as a soap technology transfer centre to other women in Mali.

Some of the factors which contributed to the success of the technology transfer by the T.C.C. to the Markala group are note worthy:

First, the group chose soapmaking themselves on the basis of their own skills, interest and resources.

Secondly, the nature and pace of the technology introduced were controlled by the members, and the achievements of a significant group cohesion and strength enabled the Co-op to benefit as an institution from the technology.

Lastly, members were involved in the adaptation of the imported technology to meet local situations.