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MARKETING RESEARCH AND STRATEGY DEVELOPMENT
FOR CERAMIC, SOAPSTONE AND METAL COOKSTOVES
IN SOMALIA

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I. MANAGEMENT SUMMARY

In the process of implementing the Somalia National Woodstove Program (NWP), it became apparent that more information about current woodstove production and marketing practices was required if VITA was to achieve its objective of promoting fuelwood conservation through the cultivation of a private sector improved stove industry. This study was conducted to gather and analyze the desired information and to make recommendations, in conjunction with VITA's experience and the results of a stoveuser socioeconomic study, about the allocation of NWP resources to ceramic, soapstone and metal stove efforts.

Generally, the information sought regarding stove production was:

- o number of producers, number of stoves produced, and production capacity
- o location and skill level of producers
- o production techniques and interest in receiving training and technical assistance
- o materials and tools used in production and their sources and availabilities
- o production costs and profit margins.

Regarding stove marketing, the information sought was:

- o methods of transport and distribution
- o location of wholesalers and retailers
- o promotion and sales techniques
- o level of sales and potential demand
- o costs and profit margins.

After conducting surveys of producers, wholesalers and retailers of ceramic, soapstone and metal stoves, the information was analyzed and the following recommendations and observations made.

General Recommendations:

1. Improved stove prices and profit margins must be equivalent to or better than those for traditional stoves of the same material.
2. The distribution channels used for traditional stove marketing are well established and effective, and they should be used for improved stove distribution as well.
3. Use home trials, tea shop demonstrations, radio messages, newspaper articles and advertisements to promote improved stoves.
4. Train VITA staff to train women's groups, retailers and others to promote and demonstrate stoves.
5. Develop quality control methods to insure that improved stoves consistently meet the standards of both consumers and VITA.
6. Assign a VITA staffperson to be Technical Director responsible for coordinating technical assistance and training.

7. Assign a VITA staffperson to be responsible for collecting woodstove information from other projects and countries, for monitoring political and legal factors, and for passing relevant information on to stove producers and retailers.

Ceramic Stoves:

1. Technical assistance should be provided to improve skill levels of producers, and to develop a higher strength stove and/or improved transportation methods.
2. Conduct test marketing in a single area, Garooley, to develop effective promotional methods.
3. Determine the feasibility of establishing new production sites near ceramic stove market areas.

Soapstone Stoves:

1. High production costs and resulting high retail price are the primary obstacles to market acceptance of the improved stoves.
2. A soapstone expert should be brought in to train Somali craftsmen and to make recommendations about improved tools and production methods.
3. Conduct market tests, and, initially, have extensionists work with a single Mogadishu retailer to develop effective promotional methods.
4. Develop packaging techniques to reduce breakage.

Metal Stoves:

1. Metalworking skills are very poor and the availability of metal is very low.
2. Metal stove work should be a lower priority than ceramic and soapstone stove work.
3. If market conditions or materials availabilities change, several prototype stoves should be developed and field tested. Training to improve skills should be provided to producers if warranted.

In addition to information and recommendations specifically related to stoves, this study yielded information about the potential for VITA's working with Somali technical institutions and about other fuel conservation methods. Relevant recommendations are as follows.

Technical Institutions:

1. VITA should develop a relationship with the technical institutions in Mogadishu and should use their expertise and facilities to develop stove prototypes and production methods.

Non-Stove Fuel Conservation Methods

1. Develop and test fuel conserving apparatus such as haybox cookers and briquettes.
2. Promote improved cooking methods such as soaking legumes, eliminating salt addition, and using baking soda.

II. INTRODUCTION

The National Woodstove Program was initiated in March 1983. In part, the purpose of the program is to assist local craft and businesspeople in the design, production and marketing of improved woodstoves and to promote fuelwood conservation. During the first year of the program it became apparent that more information about current stove production and marketing practices was needed. To address this lack of information, this study was conducted with the following objectives:

1. Characterize the existing marketing system between producers, wholesalers or retailers, and customers for ceramic, metal, and soapstone stoves.
2. Determine the potential for introduction of new or improved ceramic, metal, and soapstone stoves.
3. Document the manner in which producers obtain materials, supplies and tools.
4. Identify craftspeople to produce ceramic, metal, and soapstone stoves for market testing, and if market tests show that the stoves are acceptable to consumers, for full scale production.
5. Determine what assistance training institutions can provide toward prototype development, stove testing and production of improved stoves.
6. Document existing and estimate acceptable profit margins for producers and sellers of metal, ceramic and soapstone stoves.
7. Develop recommendations for marketing improved metal, ceramic and soapstone stoves.
8. Develop recommendations for other interventions, in addition to fuel conserving stoves, that address the deforestation problem.

This study was conducted by Glenn W. Patterson and Hassan Noor Fahiye between 15 February and 31 March 1984. Patterson has over eight years experience providing technical and training assistance in small scale food technologies and marketing and promoting various appropriate technologies. Fahiye has worked with the Somali Ministry of Industry and has extensive training in the financing and development of small industries.

III. METHODOLOGY

The type of market research conducted in this study was exploratory. The purpose was to help define the problems and opportunities related to production and marketing of fuelwood stoves. The research was also to provide, in combination with the reported results of Swale, enough information to develop marketing strategies.

III. A. Sources of Information

The production side of the market research used a variety of secondary data sources. These are listed in the references section of this report.

Primary data sources were observations and personal interviews with producers in Dhanaane, Ceel Jaale, Merka and Mogadishu for ceramic stoves, El Bur for soapstone stoves, and Mogadishu for metal stoves. For retailers, similar methods were used in Dhanaane, Ceel Jaale, Merka, Mogadishu, Qorioley and Golweyn for all types of stoves.

Primary data site selection was based on the recommendations of VITA staff and others with extensive knowledge about stove production and sales locations. In some cases, exploratory field trips were made to obtain additional information about specific names and locations of people for subsequent interviews. With the exception of the Gedo region, the sites used in this study were some of those used in Swale's socioeconomic survey to facilitate the integration of results.

III. B. Questionnaire Content, Design and Administration

Four questionnaires were developed to be administered to different participants in the stove market. Samples of the questionnaires are given in Appendices A, B, C and D.

All questionnaires were pretested and revised so that an appropriate question set was developed. This iterative process also helped develop ways to approach the respondents, establish rapport, and ask questions in a manner that would elicit truthful and complete answers.

A specific introduction was developed to explain to the respondents who the interviewer was and what he was seeking. A brief explanation of the process and why participating in the interview would be beneficial to the respondent were also given.

One questionnaire for stove producers was designed to obtain information about the type of stove produced; raw materials, tools equipment and other supplies used; problems encountered in the production process; production methods; sales volumes; distribution channels; obstacles to increased sales; present skills, need for skills training, and general interest in working with VITA to produce improved stoves. See Appendix A

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A second questionnaire, Appendix B, was designed to obtain information from wholesalers, retailers or other distributors. Information solicited included types of stoves sold and where they were purchased, number and frequency of purchases and sales, perceptions about consumer preferences and purchasing habits, ideas for stove improvements to increase sales, useful life of stoves, and stove prices and price changes during the past year.

A second retailer questionnaire, Appendix C, was designed to get more detailed information related to customer demand and to stove transport to the retailer. This survey was conducted in Mogadishu only.

Another goal of the market research was to locate skilled craftspeople who would be interested in making stoves to the specifications of VITA/Somalia for field and market testing.

Since production of metal stoves is very limited, it was believed necessary to locate a person, company or institution in each area that would be willing to collaborate with VITA to develop production techniques and train craftspeople. No appropriate individuals or businesses were known, so the Somali Technical Teachers Training College and Mogadishu Polytechnic Institute were contacted. Discussions with the administration and staff were done to obtain information about the facilities and skills available; interest in collaborating with VITA; procedures to follow to implement the collaboration; suggestions of craftspeople who would be interested in receiving training, building VITA stoves, and possibly receiving assistance in starting a metal stove production business. Appendix D presents the questions asked of the institutions.

All questionnaires used open ended questions. Some dichotomous, yes-no type, questions were used to offer more simple and interesting questions before introducing new or difficult subjects. Open ended rather than multiple choice questions were used because they allow attitudes to be expressed more freely. Also, they helped establish a good rapport and gain the respondent's cooperation in answering subsequent questions. Open ended questions also allow the interviewer to gain more insight, side comments, explanations and clarification to help in developing a clearer understanding of information provided.

A disadvantage of open ended questions is interviewer bias. The interviewer may not write down an answer verbatim, so a summarized answer is recorded which may unintentionally reflect the interviewer's viewpoint. To overcome this problem the questionnaires were administered in an informal manner. The interviews were carried out more as a free flowing discussion in which the interviewer used the questionnaire as a general guideline, and responses to all the questions were sought but not necessarily in the order or form presented on the questionnaire.

People other than the principal respondent were often present during the interviews. This was found to be quite beneficial as some of the additional people generally had extensive knowledge about the subjects discussed and were, in many cases, producers or retailers themselves. When these situations occurred, the interview became more like a focus

group, and a wide variety of responses usually resulted.

As is typical of interaction and discussion in the Somali culture, many people would overhear the discussion, and, especially if strangers were involved, would gather to listen and try to join in. Knowing this, the interviewers tried to direct questions to the principal respondents originally intended to be interviewed. People who joined the group and were knowledgeable about the stoves were often introduced to the interviewer, and the discussion would continue with responses from these people also recorded. In most cases, three to five respondents were in a group.

The interviews were carried out in a workshop or an area of a house where stove production or use normally took place or in markets where stoves are sold. Most interviews lasted 20 to 45 minutes depending on the amount of information being obtained and the amount of time respondents could allocate to the interview.

Wholesaler, retailer, and craftserson interviews were administered in Somali by Hassan Noor Fahiye and by VITA staff familiar with stoves and interviewing techniques. Hassan Noor was involved in designing the questionnaires and thus was familiar with the specific information sought. Also, interviewers studied the questionnaires carefully so that the interviews could be effectively conducted in an unstructured manner.

An interpreter was sometimes required due to differences in dialects between the respondent and the interviewer. It was stressed to the interviewers that some more detailed questions might have to be asked in such cases in order to gain the necessary information.

IV. SURVEY RESULTS

IV. A. Ceramic Stove Survey Results

IV. A. 1. Production

Ceramic stoves are used primarily for wood fires and infrequently for charcoal fires. Most of the stoves are produced in three areas of Somalia: the Banadir region (Mogadishu), the Shabelle River basin, and Baaloda. The highest concentration of producers is in the coastal villages of Lower Shabelle, such as Dhanaane, Ceel Hagi and Ceel Cadaw, where good clay deposits are found in the dry river beds and as alluvial deposits at the base of coastal hills.

Most producers are women who have learned pottery and clay working skills from relatives or friends and have, in many cases, been producing clay products for ten years or more. Making clay products is usually a parttime activity since producers have family and farming responsibilities as well.

Approximately 20 to 30 minutes are required to form a traditional stove, and maximum output for most producers is about ten stoves per day. Five or six days are needed to dry the stoves, and one or two days to prepare for firing, fire, cool and package for transport.

In the coastal towns clay is free, or nearly so, and transport costs are very low due to the short distances between the clay deposits and the production sites. For Mogadishu producers who get clay from the Merka area, the clay cost is one to two shillings per stove, and transport cost for the clay is about one shilling per kilogram. In addition to clay, water, fuelwood and asal (a coloring and strengthening agent) are used in production. Asal costs one-half shilling per stove. Firewood for firing the stoves comes from the cheapest sources available, and, at times, dried seaweed is used. The simple tools -- a sea shell, wooden sticks, and pieces of metal -- used by producers cost effectively nothing. No potters' wheels or kilns were observed at any site.

Production of ceramics declines during the rainy season since clay cannot be obtained from the river beds. No action is taken by producers to store clay before the rains. The rainy season also creates the problem of not being able to adequately dry the products before firing.

Producers make stoves on order from retailers or consumers. They sell stoves to retailers at the production site or in towns at the public markets. Stoves are sold to the retailers for 12 to 15 shillings, but the exact profit margins are difficult to determine since transport costs vary significantly depending on location. The best estimate available from the data is a ten to twelve shilling profit to the producer per stove.

Some producers said they would be interested in receiving training and

information about producing and selling stoves, but they were unable to specify what sort of assistance they would want. Currently there is no quality control or standardization, and stoves produced require no detail work and very little precision.

Many producers said they produce stoves when they receive orders from customers, so supply may exceed demand at some times of the year. Respondents could give no estimates of how many more stoves could be made if production constraints were reduced.

The best approximation available for a Merka producers' selling price, costs and profits are:

	Shillings
Selling price	12-15
Costs (materials, tools)	2- 3

Profit	10-12

A Mogadishu producer would have costs two to three shillings higher due to clay and transport costs.

IV. A. 2. Retailers

Retailers in Mogadishu purchase stoves from producers mostly in Medina, but some come from as far away as Dahansane. Rural towns in Lower Shabelle purchase stoves from the coastal villages.

There seems to be no particular time during which stoves are purchased nor any set number of stoves purchased at a given time. According to retailers, purchases are a function of demand, the number of stoves available from producers, the amount of money available, and the climatic and road conditions.

Stoves are usually transported by small trucks. Cost of transport varies according to the distance of transport and the cost and availability of fuel. The only specific value given by a retailer was two to four shillings per stove in May 1984 for transport from Merka to Qoroley.

All retailers mentioned that some stoves break during transport but that quantitative estimates were difficult to give. Two retailers said that 10 to 25 percent losses are common. Breakage is caused by the instability of the trucks, the poor quality of the stoves, improper tying of the stoves, and poor handling during loading and unloading. Packing stoves in paper or cardboard boxes or nesting stoves inside one another are methods currently used to reduce breakage. No ideas were suggested as to how breakage could be further reduced, and one respondent said it could not be avoided.

Three stove sizes, small, medium (similar to the VITA ceramic stoves) and large, are sold. The retail prices are 10-20, 25-30 and 40-55 shillings, respectively. The medium size is the most popular, but the number sold each week or month was not known by the retailers. Demand

seems to decrease during rainy seasons since people cook inside more frequently with charcoal soapstone stoves.

Retailers could not give estimates of the useful life of a ceramic stove. According to one retailer, it depends on family size (presence of children decreases stove life), how it is maintained and how often it is used. General discussions suggested a useful life of one to three years.

Some characteristics customers look for when purchasing a stove include the presence of a pot holder, low weight and thickness, good ignition, and absence of cracks. Many customers tap the side of the stove to hear if it has a slight ringing sound; if it does not, it is rejected as possibly having a crack or other weakness.

No sales promotions are done at present. Many retailers sell other clay products such as water jugs, clay pots and muufa stoves in addition to cooking stoves. There was no indication that any one product sells significantly better than any other.

The primary demand for ceramic stoves is from lower income groups, although some middle and upper income households use them as supplements to their more expensive stoves. As gas, kerosene and electricity become more scarce or more costly, the demand for ceramic stoves may increase.

In summary, the best approximation of selling price, costs and profits for a ceramic stove retailer per unit sale are:

		Shillings
Selling price		25-30
Costs -- transportation, taxes, rent	5-6	
-- stove cost to retailer	12-15	
		17-21
Profit		----- 8-9

A Mogadishu retailer would have costs approximately two or three shillings lower since transportation would be incurred by the producer. These retailers, however, might face a higher price from the producer.

IV. B. Soapstone Stove Survey Results

IV. B. 1. Production

The results reported here on the Soapstone Cooperative were gleaned from personal communications with Said Tukale Hami, Chief Of Extension for the NWF and from other VITA staff who have recently visited the Cooperative's production center in El Hur, 400 kilometers northwest of Mogadishu. Mr. Tukale and the other staffmembers are familiar with the operation of the Cooperative.

Soapstone stoves, incense burners, and ashtrays are produced in El Hur by the Soapstone Cooperative. The Cooperative was established in 1976 by the United Somali Cooperative Organization of the GSDR, and it has a near monopoly on all mining and artisanal production of soapstone and soapstone products in Somalia. The Cooperative's headquarters are in Mogadishu, and it is a part of the Industries and Handicraft Cooperatives Branch of the Ministry of the Interior.

Soapstone stoves are made as a large, inverted cone, hollowed-out to accommodate charcoal, mounted on a smaller cone-shaped base. Three sizes of stove are made: large (top diameter approximately 32 centimeters), medium (top diameter 25 centimeters) and small (top diameter 16 centimeters). The diameters noted are only approximations as actual sizes depend on the size of the raw block of stone. Small stoves differ from the larger sizes in that they are a single piece and are used for heating tea and burning incense. The medium and large models, which require the two cones to be joined by hammering a nail along their axis, are used exclusively for cooking.

The Cooperative estimates that, since 1981, stove production has leveled off to approximately 35,000 units per year. Incense burner production continues to increase and currently stands at 80,000 items per year. One man can produce three or four medium or large stoves per day. Tools are limited to a hand-held, hoe-shaped cutting tool with a five centimeter blade length and a few other simple, locally produced wood and metal tools. Approximately 90 craftsmen are capable of making stoves. Payment is made on a piecemeal basis with some division of labor and sharing of responsibilities accepted for mining the stones. For each small or medium sized stove produced, the Cooperative retains 30 shillings, the miner receives 40 shillings, and the craftsman receives 50 shillings of the 120 shilling price to wholesalers. The Cooperative has expressed a keen interest in improved tools and production techniques.

The Cooperative has identified three types of soapstone within a 20 kilometer radius of El Hur. The selection of the type depends on the intricacy of the work required. Most of the soapstone for the stoves is quarried seven to ten kilometers from the primary production site in El Hur. Additional work has begun at a quarry 60 kilometers from El Hur. The status of reserves within the El Hur area and the new production site is unknown. Soapstone production on a smaller scale occurs in the Las Anod area.

High transportation fees due to fuel costs, frequent fuel shortages, and the rough local terrain are a primary constraint to soapstone stove

marketing. While there seems to be an interest from consumers in trying improved design stoves, some Cooperative members have shown resistance to producing new models of stoves. Unless the saleability of the new stoves is demonstrated very early and clearly, this resistance is expected to increase as more rigorous design specifications are introduced.

IV. B. 2. Retailers

From the El Bur production site stoves are sold to retailers and wholesalers from major towns (including Djibouti) who provide transport and, to a much lesser degree, directly to consumers in El Bur. Stoves are also sold, in some cases, to retailers after transport to Mogadishu by the Cooperative. Wholesalers and retailers claimed that transport costs were not known. Cooperative members stated that transport to Mogadishu costs ten shillings and transport to Hargeisa costs twenty shillings per stove. For all destinations, packaging of stoves costs two shillings, tax is seven shillings and loading is two shillings per stove.

Breakage during transport is considered a significant problem. One wholesaler estimated that 10-15% of a shipment will break in transit. Breakage is the result of poor packaging and handling and rough roads. Currently, packaging entails placing cardboard between two stoves and tying them together with rope. An improved, perhaps reusable, packaging method is desired.

Of the Mogadishu retailers interviewed, three to ten stoves per month was the sales volume. The number of stove purchased from the Cooperative or wholesalers is, they claim, a function of market demand, stove availability and availability of funds. Retailers maintain no records and are reluctant to provide information to strangers. The purchase estimates given ranged from 10 to 250 stoves per purchase, and it was stated that this number varies for each retailer and each purchase.

As with other stoves and products, sales promotions for soapstone stoves are generally passive. The stoves are simply displayed outside the retailer's shop, and an explanation is sometimes given by some retailers. Sales are greatest just before the rainy season as women prepare to move cooking inside and shift from three stones to a stove. Also, during the rainy season stoves are not displayed outside shops as frequently and the level of shopping activity decreases.

Most soapstone stove retailers are women, and most sell soapstone stoves and incense burners, aluminum pots and pans, enamelled pots and pans, and glassware. A few also sell metal stoves. Retailers said they knew neither which products sold better than others nor what proportion of their total sales were stove sales.

Many of the retailers interviewed thought they could sell more soapstone stoves but that they were limited by the availability of stoves from the El Bur production site. In mid-June, at the height of the rainy season, many retailers had inventories of 100 stoves or more. In mid-August, the Soapstone Cooperative in El Bur held an

inventory of 3,500 stoves. The various pieces of information are conflicting, and the best analysis of the situation may be that the soapstone market has reached an equilibrium in which demand and supply are approximately equal.

From the customer's point of view what are sought are stoves with bright, smooth surfaces and conveniently positioned potholders. As Smale's research showed, stove appearance is a very important factor in soapstone stove purchases. The medium sized stove is by far the most popular. It provides an acceptable tradeoff between cost and ability to cook adequate amounts of foods.

Stove life is another variable that is difficult to measure. Some users stated they expect soapstone stoves to last 10 to 25 years; more frequently, a three to five year lifetime was cited by users. Many said that stove life depends on the maintenance that the stove receives. For purposes of this study, a five year lifetime was used.

The Soapstone Cooperative sells small and medium sized stoves for 120 shillings and large stoves for 300 shillings. Wholesale and retail shilling prices are as follows:

	Price Wholesaler to Retailer	Price Retailer to Consumer
Small	130 - 230	200 - 250
Medium	230 - 400	280 - 400
Large	350 - 450	350 - 500

Recently, prices for the stoves have been increasing at 30 - 40 % per year.

IV. C. Metal Stove Survey Results

IV. C. 1. Producers

Most of the metal stoves are made by some 100-150 metalsmiths (including blacksmiths) located in the Sigaale, Bondhere, Horiwaa, Bakaraha and Medina markets of Mogadishu. It is understood that metalsmiths in Lugh, Gorioley and Baidda also make the stoves.

The metal used most commonly is scrap steel from kerosene cans, oil barrels and corrugated steel sheets. Prices for these, as quoted on 16 April 1984 from the Horiwaa market in Mogadishu, are as follows.

Item	Size	Price (shillings)	Cost per 100 sq. cm. (shillings)
Steel sheet	120cm x 40cm x .6mm	70	1.45
Steel sheet corrugated	2m x 1m x .6mm	600	3.00
Oil drums open and flat (200 liter)	90cm x 180cm x .6mm	300-400	1.25-2.47
Kerosene cans	1.20cm x 40cm x .4mm	40-80	83-1.57

The cost and availability of these materials depend on cooking oil imports, building material imports, and the level of construction activity at a given time. Kerosene cans were once available from the Somalia Petroleum Agency, but this source is no longer an option, and the supply of cans is now very limited.

In addition to the stoves made from the above materials, some metalsmiths weld three metal bars onto car tire discs to make a stove. The Xamar Weyn market is a primary production area for these stoves, but production levels, costs and prices were not given to enumerators.

Most metalsmiths (including blacksmiths) use simple traditional tools-- hammers, pliers, punches, tin snips, anvil, hot air bellows and force. These are locally available and most can be produced by local craftspeople. Some metalsmiths have access to more expensive equipment such as welders and metal bending and cutting tools.

Most metalsmiths repair metal products and, when time and materials permit, make a variety of products including stoves, knives, pots, and hand tools. Stoves are often made when a customer furnishes the materials to the metalsmith; this is particularly true for kerosene can stoves.

It was difficult to get production figures and costs since stove

producers do not keep records and/or are reluctant to divulge information to strangers. The only figures available indicated that some metalsmiths producing kerosene can stoves pay 40 to 80 shillings for materials and charge retailers 90 to 100 shillings for the stove. The retailers sell the stove for 120 shillings.

Metal and labor costs, resulting in high costs to consumers, are the major obstacles to increased production and sales. The final cost of improved design prototype stoves in Mogadishu ranged from 230 to 1500 shillings depending on the particular design produced. Production costs, especially labor, are higher in Mogadishu than elsewhere, and the stoves VITA asked metalsmiths to produce were unfamiliar designs and so required extra labor. The skill level of most metalsmiths is inadequate for producing high quality improved designs consistently. With the current skill level and available tools and materials it does not seem that costs can be decreased enough to make improved metal stoves competitive with other types of stoves in the southern part of the country.

IV. C. 2. Retailers

Information about metal stove retailers was even more scarce than information about metalsmiths. Most retailers are located in the same areas as soapstone stove retailers, and, in many cases, are one and the same. One retailer interviewed purchased kerosene can stoves for 100 shillings from a producer in Mogadishu. She sold the stoves for 120 shillings and claimed to sell about 20 a month compared to five soapstone stoves a month. She said that some people preferred kerosene can stoves because they were lower in cost, cook faster and many people find them easier to use than soapstone models.

Demand for metal stoves seems to be greater than supply, and, again, a primary problem is lack of raw materials for production.

V. ESTIMATES OF DEMAND

It is difficult to estimate the total demand for any type of stove based on current supply figures. Metal stove data is so limited that no reasonable conclusions can be drawn from them. Ceramic stoves are usually produced on an as-requested basis, and this may indicate that existing production capacity exceeds demand. Ceramic stove retailers indicated, however, that transportation problems - high fuel cost, fuel shortages, breakage - prevent their being assured of a consistent supply of stoves. As a result, retailers will sometimes maintain a relatively large inventory since they are unsure when another shipment will be received. For soapstone stoves, both retailers and producers maintain large inventories at times. It appears that soapstone stove supply is approximately equal to demand.

Since existing supply and demand figures were so uncertain, estimates of demand were made based on population, demographic and stove use statistics.

For the Mogadishu, Lower Shabelle and Gedo regions, Smale determined the percentages of the populations using various types of stoves. These are given in Table A. The actual number of households surveyed was small, but the results are believed to be representative of the general populations except where noted in the table. Combining this information with population estimates for the three areas yields the Table B estimates of absolute numbers of stoves used. The total possible 1985 purchases of improved stoves for the three areas and for the entire country are shown in Table C.

TABLE A
PERCENT OF POPULATIONS USING VARIOUS STOVE TYPES
(Source: Smale, 1983)

Stove Type	Lower Shabelle		Mogadishu	Gedo
	Refugee	Non-Refugee		
Ceramic	74	40	19	0
Three stone	19	50	1	86
Soapstone	3	0	69 (a)	1
Modified three stone (b)	0	5	1	1
Multi purpose	0	3	0	0
Muufa	0	3	0	0
Metal	3	0	1	0
Table stove	0	0	9	0
Mud/Cement	0	0	0	(c) 12
	----- 100	----- 100	----- 100	----- 100

(a) The percentage of Mogadishu households using soapstone stoves shown here is not representative of the general Mogadishu population because the survey contained a disproportionately high number of middle and upper income households. In the lower income area surveyed, 60 percent of the respondents used ceramic stoves and 17 percent used soapstone. For subsequent calculations, the proportions assumed were 40 percent using ceramic stoves, 40 percent soapstone and 10 percent metal.

(b) A windblock was being employed around the three stones.

(c) Maganey camp was the location of these stoves. This number is not illustrative of the Gedo Region population as a whole.

Percentages may not sum to 100 due to rounding errors.

TABLE B
ESTIMATES OF STOVES USED IN LOWER SHABELLE, MOGADISHU AND GEDO

Area	Population (1984 estimate) (a)	Number of Families (b)	Stove Type Used			Total
			Ceramic	Soapstone	Metal	
Lower Shabelle refugee	41,000	7,884	5,850	237	237	6,354
non-refugee	509,166	97,916	39,166	0	0	39,166
Mogadishu	572,580	110,111	44,044	44,044	11,011	99,099
Gedo (c)	452,721	87,062	0	958	0	958
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TOTAL	1,575,467	302,973	89,060	45,239	11,248	145,547

(a) Calculated using 1975 census data and a 3.05 percent per annum population growth rate.

(b) Assuming 5.2 person per family average.

(c) Population figures include an estimated, according to UNHCR, refugee population of 137,000.

TABLE C
TOTAL DEMAND FOR STOVES IN LOWER SHABELLE
MOGADISHU, GEDO AND SOMALIA OVERALL

Area	Projected 1985 Population (a)	Projected Number of Families in 1985 (b)	Possible Purchasers of Stoves (c)		
			Ceramic	Soap- stone	Metal
Lower Shabelle					
Refugee	42,312	8,137	6,021	244	244
Non-refugee	524,696	100,903	40,361	--	--
Mogadishu	590,902	113,635	45,454	45,454	11,364
Gedo	466,529	89,717	--	897	--
			-----	-----	-----
TOTAL			91,836	46,595	11,608
Somalia					
Urban (24.0%)	1,315,390	254,882	101,953	101,953	25,488 (d)
Rural (26.0%)	1,435,839	276,122	110,449	--	-- (e)
Nomad (50.0%)	2,761,229	531,006	--	5,300	-- (f)
			-----	-----	-----
TOTAL			212,402	107,253	25,488

(a) Using 1975 census data and a 3.05 percent per annum population growth rate

(b) Assuming 5.2 person per family average.

(c) Assuming percentages given in Table A.

(d) Assuming urban purchases are the same as Mogadishu stove use patterns.

(e) Assuming rural purchases are the same as Lower Shabelle non-refugee stove use patterns.

(f) Assuming nomad purchases are the same as Gedo stove use patterns.

To estimate the annual demand, the total possible purchase figures in Table C must be modified to account for the useful lives of the stoves, 2, 5 and 3 years, respectively, for ceramic, soapstone and metal stoves. The resulting estimates of actual stove purchases are

Estimated Stove Purchases 1985

	Ceramic	Soapstone	Metal	TOTAL
Mogadishu, Gedo, Lower Shebelle	45,918	9,319	3,869	59,106
Somalia	106,201	21,451	8,496	136,148

The percentage of the total purchases of stoves that will be improved stove purchases depends on the effectiveness of the design, production and marketing efforts developed. If improved stoves match the costs and performances of traditional stoves, it seems reasonable to expect that, at the end of one year, 50% of monthly stove sales will be improved stoves for those retailers offering both traditional and improved models.

Demand for stoves should increase beyond the figures shown here as the urban and rural population percentages increase and the nomad percentage decreases.

VI. RECOMMENDATIONS

VI. A. General Recommendations

A variety of factors determine the demand for cooking stoves. Producers and retailers of improved stoves have a degree of control over some of these factors -- price, promotional methods, distribution, product characteristics -- while other factors such as basic demand, competition, and economic climate must be considered but are beyond their control.

In the long run, overall demand for less costly stoves should grow as the cost of living increases and results in higher electric, gas and kerosene costs. Lack of availability of the more expensive stoves and fuels may also become a problem. If the demand for low cost stoves is to be directed toward improved rather than traditional models, promotions, improved production methods and competitive pricing must be initiated and sustained.

1. Stove Prices

Price is one of the most important factors influencing a customer's desire and ability to purchase a stove. For example, groups from the Lower Shabelle stated that they would choose a stove which is more fuel efficient, but only if its price was equal to or lower than that of a traditional stove with which they are familiar. Responses from groups in Yurkud in the Gedo region and from Mogadishu indicate that the price for improved stoves should be between those of traditional ceramic stoves and traditional soapstone stoves. These price requirements also hold true for improved metal stoves. Metal stoves, since they are unfamiliar to most consumers, will be directly compared to soapstone and ceramic stoves, and their prices will have to be similar.

Inflation provides a further incentive to keep improved stove prices low. According to the Somali Ministry of Planning, in February 1983 a consumer had to spend 398 shillings per month for food purchases. By February 1984 this figure had risen to 1026 shillings for the same amount and quality of food -- an increase of 158%. The Mogadishu Family Budget Survey of 1977 indicates that 60% of a family's monthly expenditures are allocated to food purchases. The average consumer's ability to buy non-food items, including stoves, is continually being reduced.

2. Promotions

a. Methods

Currently, very little promotion other than word of mouth is done for stoves in Somalia. Producers and retailers simply display stoves at locations near production sites or in open air markets where customers purchase many of their food and non-food items. It appears that developing effective promotional methods for improved stoves could

have a significant impact on consumers' interest in and acceptance of them. Six techniques applicable to stove promotion are suggested here.

1.) Home trials. As a promotional technique, home trials are the most effective way to get improved stoves into homes. One approach is to have customers take home, for a specified period, a stove they have purchased. If the stove does not perform to their satisfaction, they would return it for replacement or refund. Home trials help reduce the risk a customer feels in purchasing a stove, and they insure that the stove is exposed to several users in the setting in which information exchange usually takes place. Home trials can be very beneficial as a promotional tool as long as stoves operate well. If stove performance is poor, though, home trials will seriously hamper any future efforts to promote them. Home trials require more monitoring, follow-up and record keeping than other promotional techniques, but they also allow sellers and VITA extensionists to gain direct user information.

Small reports interest on the part of both elders and women's groups in having improved stoves be promoted through women's groups. This is an attractive option since the women have extensive local knowledge and experience with traditional stoves. For home trials, the women could be given or sold at a discount a stove to take home and promote to their neighbors and friends.

If women's groups are to be used for other promotions, VITA extensionists should thoroughly train the groups by providing both technical and promotional assistance. The women could also be trained as stove producers. This would involve greater expenditures and extension efforts, but it would establish a basis for several small businesses and further develop the level of local skills. The problems inherent in setting up an income generating activity owned and managed by a group must be considered. Promoting and selling through established, individually owned shops could prove more successful. The recommended approach is to use the women's groups to market and promote the stoves, then train groups members to be producers if the promotional programs are successful.

2.) Tea shop promotions. This is essentially a method of providing continual public demonstrations of the stoves. Improved stoves could be given, loaned or sold at a discount to tea shop owners who now use traditional ceramic or soapstone stoves. A VITA extensionist could explain to tea shop owners what the stoves can do, ask them to use them for a specific period of time, and monitor their fuel consumption and performance. In addition, incentives such as a free or reduced price stove could be offered to the participating shop owners if they succeed in promoting the stoves for a local retailer.

3.) Point of sale demonstrations. For any stove with which people are not familiar, an educational process must be initiated if a

favorable response is sought. Demonstrations need to be given to retailers, producers and consumers. To do this, VITA extension staff must know and be able to demonstrate each of these characteristics:

- The correct dimensions and tolerances of the improved stoves and the importance of using these specific measurements.
- How traditional and improved stoves are made including knowledge of the materials used and the problems of production.
- The special features, advantages and disadvantages of traditional stoves.
- The special features, advantages and disadvantages of the improved stoves and why their advantages outweigh their disadvantages.
- Methods by which the customers can quickly see and, preferably, experience the special features and advantages of the new stoves.
- Specific ways to help the retailer. Simple ideas such as putting up signs announcing the availability of improved stoves can be used to gain customers' attention.

Staff working to promote the stoves should be familiar with the local marketing practices, speak and understand the local dialect well, know traditional cooking methods and problems, and be able to meet and talk with people easily. The staff should be convinced that the stove is good and, if possible, should use it themselves. Ideally, promoters should be women.

4.) Radio messages. These will have the effect of increasing consumer awareness about both stoves and the general fuelwood problem. VITA has used this medium before and should continue to do so. Radio messages should focus on specific, quantifiable benefits to the stove user. For example, a message describing how covering embers to save them for later use should include specific figures on the shilling value of the fuel savings.

Several questions should be answered to insure the effectiveness of radio messages:

- What portion of VITA's target population listens to the radio?
- During what times should messages be aired in order to reach the maximum percentage of the target population?
- Does the message use language and technical information easily understood by the target population?
- Are the messages more effective if the same message is repeated frequently or if a series of different messages are used?
- Would a dialogue or short story involving two or more persons be an effective way to get radio messages across?
- When giving the message, does the radio announcer convey a feeling that he or she personally believes in the product?

5.) Newspaper articles. These can also be effective if given in a series. They could be used to explain different aspects of the fuelwood problem, reasons for increased fuelwood prices, examples of what some Somalis are doing to reduce fuelwood use and cost, methods that have been effective in other countries,

fuel conserving cooking methods, and the advantages of using improved stoves. Newspaper coverage is limited mostly to Mogadichu, so only the literate, urban population will directly benefit from this effort.

Newspaper advertisements could be used, and, while too costly for use by individual producers or retailers, VITA could sponsor advertisements on improved stoves in general and on the importance of conservation. Advertisements can be used to attract consumer attention initially and to quickly get consumers familiar with the name, appearance and cost savings of the stoves.

5.) Printed public announcements. Since the stove market currently uses no promotions, posters and signs can be simple, effective ways to get a customer's attention. The cost of printing, developing effective messages and distributing posters, however, may be high. The amount of written information a poster can convey is limited, but the visual images can be a very effective communication method. Stove sales and demonstration locations should be included on posters.

b. Product Characteristics to be Promoted

Each stove being considered -- ceramic, soapstone and metal -- has unique characteristics, and each should be promoted in a way that highlights its benefits and clearly shows how it meets the expectations of the consumers. Based on the socio-economic survey results of Smare, consumers desire combinations of the following features:

- 1) portability
- 2) ability to save embers
- 3) moderate smoke production
- 4) production of minimal waste heat
- 5) low fire and burn hazard
- 6) reduced cooking time
- 7) reduced fuel consumption
- 8) ability to use both wood and charcoal
- 9) good appearance
- 10) durability, ease of maintenance, and ease of repair
- 11) stability or low center of gravity
- 12) ability to be raised off the ground during rain; strength when wet or a design that allows simple methods of restrengthening
- 13) ability to use many pot sizes and to make canjero
- 14) ability to cook at least two foods simultaneously
- 15) incense burning and lighting capabilities
- 16) easy ignition and maintenance of ignition
- 17) ease of learning correct methods of operation

1B) similar cost to traditional stoves.

The VITA extension staff needs to be able to explain and demonstrate as many of the stove features listed above as possible. For example, the reduction of waste heat can be demonstrated by having observers touch stoves while they are cooking since the sides of improved stoves are cooler than those of traditional stoves. This can also be used to point out the reduced burn hazard offered by improved stoves. Two stacks of wood representing the amounts of fuel necessary for improved and traditional stoves is an effective way to communicate fuelwood savings. Demonstrations of other features such as low smoke production, the ability to use several pot sizes, and portability are straightforward.

Promoters should relate demonstrations to specific, quantifiable benefits. With the waste heat demonstration, it should be stressed that cooler sides mean that more of the fuel's energy is used to cook foods and less is wasted, so less fuel will be needed, and time and money will be saved. Whenever possible, the amount of money that will be saved by using an improved stove should be explicitly stated.

Promotions used should be designed to point out those features which are of greatest interest to a target population. Smale showed that the importance of the specific features varies among and within regions, between refugee and non-refugee populations, and possibly within a given community. This situation creates the problem of designing and promoting stoves that meet as many sets of consumer constraints as possible.

One approach to the problem is to develop a single model of stove but to promote it differently in areas with different consumer preferences. For example, the stove's ability to conserve fuel and thus reduce fuel costs would be promoted strongly to refugee customers in the Lower Shebelle, while shorter cooking time and lower fire hazard would be emphasized to non-refugees in the area, and the stove's good appearance would be promoted to Mogadishu customers.

Another method is to design and promote a variety of stoves, each offering the set of features desired by a specific customer group. This method makes mass production and quality control more difficult, and it results in higher costs.

An intermediate method is recommended for VITA --- an incremental approach. Initially, one stove model should be made for all customers in a particular market, for example all residents of the Lower Shebelle (refugees and non-refugees). Since production skills are limited, this would allow producers to thoroughly learn the method of production of one type of stove and thus cultivate better quality control. Test marketing should also be done in one area initially so that VITA extensionists and local retailers can thoroughly learn one set of marketing techniques. Later, a second stove design and set of promotional techniques should be developed to meet a different customer group's preferences. The program can

expand from this point. Specific approaches for individual stove types are described later.

3. Political and Legal Factors

There is little that stove producers and retailers can do about the situations in which they operate, yet legal and political factors can affect their businesses. A VITA staff person should be given the responsibility of monitoring factors such as fuel (all types) prices and availability; import regulations; changes in policies affecting stove materials, tools and marketing; and domestic and foreign government programs or assistance efforts that involve stoves.

Interpretations of how these factors may affect improves stove businesses should be made and passed on to producers and retailers. An example of a relevant policy would be the Somali government's allowing Kenyan stoves to be imported. Somali retailers would need to know how their products compare to and how they could compete with the imports.

4. Technical Assistance

A primary focus of the VITA extension staff should be providing technical assistance and training to producers and setting up systems for quality control of improved stove production. VITA should assign one person as a technical director to keep up to date on stove design, raw materials, tools, and methods of production. Information is available from many international organizations, and contacts for information exchange should be maintained on a regular basis. It is also important to share with other countries Somalia's experience with improved stoves.

As recommended in a subsequent section, contacts should be developed with the Somalia Polytechnic Institute and the Somalia Technical Education Teachers' College so that their expertise and facilities may be used to do further development, testing and training.

VI.B. Ceramic Stove Recommendations

Field tests and limited test marketing to date indicate that consumers are interested in the improved ceramic stoves. Producers and retailers, however, need to be assured of profits equal to or greater than those they receive from traditional stoves.

Producers currently charge five to eight shillings more for improved design stoves than for traditional models. The higher price is, most likely, due to the increased labor involved in producing the VITA designs or to producers' assumption that VITA will provide subsidies so retailers can afford to pay higher prices. To address the latter, it must be made clear that no subsidies will be granted. Regarding the increased labor requirements, it is apparent that VITA needs to continue to provide technical assistance to producers.

A ceramics expert should be brought in to provide training to Somali ceramists from all regions in which VITA does ceramic stove work. The training should include instruction in clay preparation, techniques of production for both dry and rainy seasons, firing and finishing of products. VITA should also assist producers by providing information about and access to improved tools, potters wheels and kilns. A VITA technician should begin by building kilns and training ceramists in their use.

In areas where there are markets for ceramic stoves but no producers, VITA should investigate the feasibility of establishing new producers. For areas without clay deposits, this may mean assessing the economics of transporting clay, wet or dry, to production sites near the markets.

Further assistance to producers should be provided in the form of locating retailers to sell the improved stoves and bringing them in direct contact with the producers. Establishing these linkages is a necessary part of assuring producers that there is a strong demand for the improved stoves and that it is to their benefit to produce them. Making this connection is equally important to the retailers, as they must be assured of a consistent source of high quality products.

The retailers also need assistance in reducing breakage during transport and in developing promotion and sales techniques. The breakage problem can be addressed by designing higher strength stoves or by designing an improved packaging system. VITA should consider the options and select an appropriate method for dealing with the problem. As described in the General Recommendations section, retailers should be trained to use promotional methods appropriate for their target markets. This will require VITA extensionists to train retailers how to demonstrate and discuss the advantages of improved ceramic stoves.

A detailed test marketing plan for ceramic stoves is presented in Appendix E. As suggested above, it involves the use of a single producer and a single retailer in an area familiar with VITA's work. It is recommended that, for each retailer, specific weekly sales targets as a percentage of total stove

VI. C. Soapstone Stove Recommendations

Currently, the greatest obstacle to getting improved soapstone stoves into consumers' homes is high production costs. Generally, the stove designs and performances are acceptable to consumers, but the unsubsidized price is too high. The Soapstone Cooperative craftsmen claim that the VITA stoves require much more time and effort to produce and often require larger blocks of raw soapstone than the traditional designs. Each of these raises the price of the stoves. To bring the price of improved stoves into line with the price of traditional stoves, the production costs must be decreased. This can be achieved by refining the design to make it a smaller, easier to carve stove and/or by improving the productive abilities of the Cooperative. VITA should continue to work toward a lower cost, fuel efficient design, and VITA should identify new tools, methods and skills that would be beneficial to the craftsmen.

Technical assistance for production methods should be provided by bringing a soapstone specialist to the El Bur cooperative to do some training of the craftsmen and make recommendations regarding improved tools. First, this will require a needs assessment to determine what specific training would be most beneficial. Then a specific schedule and plan should be worked out with the Cooperative before the trainer is brought in. Improved skills and tools should enable the craftsmen to produce good quality stoves at a much lower cost. It will also enhance their ability to produce more of the current products and, perhaps, to develop new products. VITA should assist the craftsmen in gaining access to any tools that would improve their production process.

The other elements of the traditional marketing process that need technical improvement are stove transport and packaging. Ideally, VITA will be able to develop a low cost, reuseable packaging method that significantly reduces breakage. Again, this improvement will benefit not only the new stoves but all soapstone products made by the Cooperative.

As with the ceramic stoves, test marketing and promotional methods are the areas that require attention once a technically acceptable stove design has been achieved. For test marketing, the same general procedure suggested for ceramic stoves is recommended for soapstone stoves. VITA extension staff should develop specific demonstration and promotion methods and they should select one retailer in Moqadishu to work with. As demand for the stoves grows, and as VITA learns what marketing methods are effective, the extension staff should begin to train more retailers. Also, as early as possible, VITA should work with women's groups and other organizations to begin demonstrations. Market testing for soapstone stoves should include households that have generally used ceramic stoves. It is important to learn whether, with adequate promotion and education about the fuel savings and longer lifetimes of soapstone relative to traditional ceramic stoves, ceramic stove users will be interested in the improved soapstone stoves.

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VI. D. Metal Stove Recommendations

Currently, there is very little metal stove production in Somalia due to the limited supply of metal and metalworking skills. In light of these conditions, the metal stove development program should be given a lower priority than the ceramic and soapstone stove programs. Improved metal stoves face too many barriers -- materials shortages, poor production skills, a market unfamiliar with the products -- to warrant VITA's allocating scarce resources to them at this time. If the market for metal stoves becomes more attractive in the future, a program of prototype development, field testing and production training could be initiated.

If market conditions become favorable, VITA should work with the technical institutions in Mogadishu to develop and test prototypes. (See the Technical Institutions section and Appendix F for more information.) When two or three models with acceptable efficiency and design characteristics are developed, limited field tests should be started. As with the other stove types, this will be an iterative process of receiving feedback from consumers about stove performance and acceptability, receiving feedback from producers about production costs and capabilities, making design changes and then submitting for field tests.

A key aspect of any metal stove program will be providing technical assistance to the producers. This should involve bringing a metalsmith with experience in stove production to Somalia for a one or two week training course. VITA should also assist producers in contacting materials suppliers, purchasing tools necessary for higher quality work, and making contacts with stove retailers.

VII. TECHNICAL INSTITUTION SURVEY RESULTS AND RECOMMENDATIONS

VII. A. Institution Survey

Abdullahi Adde, Principal of the Somalia Technical Teachers Training College, and Omar Hussein, Administrator of the Mogadishu Polytechnical Institute were contacted to determine what assistance their institutions could provide to the National Woodstove Program.

Both schools have training facilities for sheetmetal working, metal machining, welding and blacksmithing. No facilities or expertise are presently available for ceramic or soapstone work, although it may be possible that tools and other equipment for working with these materials could be developed.

Both institutions have done contract work for outside groups such as the police and other government agencies. This work is usually done on a one-time basis, and they do not contract for production or repair on a regular basis. In many cases, the work done is related to speciality work which cannot be done easily elsewhere in Somalia.

The administration of both schools expressed great interest in assisting VITA. To initiate a project, VITA should contact the administration of either institution to get verbal approval. Staff will be assigned to the project and the inputs (raw materials, tools, etc), outputs (training, prototype model development, written recommendations, etc.) and incentives will be discussed and agreed upon. Staff would usually have to work on VITA projects during their free time, and they would not receive extra incentives from the schools. VITA must, therefore, be prepared to provide any incentives required, and the incentives will have to be approved by the administration. The Ministry of Education is encouraging the schools to make their facilities more available to worthwhile projects, so administration-solicited incentives may not become an issue. Staff at the Somalia Technical Teachers Education College, however, are mostly UN Volunteers and may have contracts that prevent their receiving direct financial incentives.

Neither contact suggested other institutions that might be able to assist VITA with prototype development or production training. Perhaps as they become more familiar with VITA's work such suggestions could be made.

VII. B. Recommendations

The two institutions contacted have facilities and expertise that could be beneficial to prototype development and production technique design for metal stoves. If VITA chooses to use these resources, the following guidelines are recommended.

1. Select a contact person at each institution with whom VITA will work consistently. With these contacts, negotiate the specifics of the agreements, e.g., staff incentives, required inputs of each party. Regarding staff incentives, it is

suggested that 50 to 70 percent of the cost of previously produced VITA metal stoves be offered to the assisting staff.

2. A VITA staff person should be assigned to work with the school's staff whenever they are working on the stoves, so new techniques can be learned and passed on to stove producers. This will also provide more interaction about the features that should be incorporated into the stove designs.

3. Feedback to both school staff and administration should be provided to show how their recommendations were used and what the results were. Written acknowledgment should be given to the participating staff with copies to the school and the Ministry of Education. This can act as a non-monetary incentive and could encourage future cooperation.

4. School staffs' interest in providing training or other assistance outside the school facilities should be sought.

5. Initially, VITA should work with both schools, and, subsequently, the capabilities and costs of working with each should be determined. After both have completed one or two development projects, VITA should decide with which school collaboration should continue.

VIII. NON-STOVE FUEL CONSERVATION RECOMMENDATIONS

As part of the goal of promoting fuel conservation in general, VITA is in a position to recommend strategies beyond those specifically related to stove improvements. Several methods and products that could be promoted are presented here.

1.) Cooking pots: The Somali Aluminum Factory, which makes cooking pots, should be approached about producing a pot that better fits stoves and thus uses more of the heat from fuels. If possible, methods should be developed to allow a variety of pots to be used on the same stove with nearly equal efficiencies. Pot lids could be designed or adapted to conserve heat by insulating with a fire resistant material.

2.) Briquettes: VITA/USA has information about and experience in making fuel briquettes with a wide variety of machines and feedstocks. With briquettes, straw, vines, stalks, corn cobs, charcoal dust, dried seaweed, bagasses (sugarcane residues), wood shavings, sawdust, and manure can be used as fuel sources. Cassava starch, and perhaps other substances, are available in Somalia and can be used as binders. Briquette technology should be transferred, adapted and field tested in Somalia. Much has already been done in Kenya, and it may be possible to have briquettes initially produced in other countries for field testing in Somalia.

Briquette making could become an income generating activity in areas where raw materials are produced or sold. When investigating briquette making in Somalia, though, it is important to consider the alternative uses of feedstocks -- mulch, compost, erosion control, etc. -- to insure that they are used in the most productive activity.

3.) Improved cooking methods: Stove customers should be shown ways to improve the heat transfer from the fuel through the pot to the food. Techniques such as stirring more frequently, reducing the depth of the food mass, cutting food into smaller pieces, and cooking longer but using less fuel can decrease overall fuel consumption. These must be demonstrated so customers can easily see how cooking time is reduced or fuel conserved.

While demonstrating these methods, explanations should be given to the observers. For example, explain that it is very difficult to heat/cook the center of food, and increasing the surface area of foods, i.e., cutting them into smaller pieces, means that heat will reach the center more quickly and cooking time will be reduced. Also, it can be explained that for large pieces of food such as meat, cooking at low temperatures for longer times will actually save fuel and may improve the meat's nutritional value and tenderness.

4.) Soaking and cooking legumes or beans: Several techniques can be demonstrated and promoted for reducing cooking times and increasing

consumer acceptance of beans.

- a) Remove or scarify (scratch with a wire brush or rub between two small mesh wire screens) the hulls, and scratch the surface of dehulled beans before soaking and cooking.
- b) Reduce storage time since storage causes hardening of the hulls and so increases cooking time.
- c) Add baking soda when soaking or cooking. One quarter teaspoon per liter of water is recommended. (Adding too much soda will increase the pH of the water above 8.0, giving the food an alkaline flavor and destroying some vitamins.)
- d) Soak beans before cooking to soften them and reduce loss of nutritional value. Cooking times can usually be reduced by 30 to 45 minutes.
- e) Avoid adding salt during cooking as this causes the beans to remain hard and thus increases cooking time.

5.) Haybox cookers: These cook food by using the heat contained in the water and the partially cooked foods to prolong cooking. The boxes or other containers are highly insulated to keep heat in the pot during cooking. The containers can be made with a variety of local materials such as baskets or blankets. Several haybox cooker designs should be developed using different materials, and they should be tested to determine what local foods could be prepared in them and what the fuel savings would be. Rice, meat, legumes, and grains should be readily adaptable to haybox cooking. Foods requiring repeated stirring or addition of spices or other ingredients will be more difficult to adapt to this method.

Haybox cookers are particularly useful for precooking foods such as legumes. Foods can be partially cooked using coals from one meal, and then can be placed in the haybox cooker and be ready for eating at the next meal.

6.) Solar cookers: The high levels of insolation available in Somalia make solar technologies technically viable. The high cost of materials and the absence of skills necessary for both focusing and hot box solar cookers, however, make the products far too costly for low income households.

Hot box solar cookers could be developed and field tested for middle and upper income groups. These would be suitable for cooking afternoon and, potentially, evening meals, and the size of the cooker determines the number of foods that can be cooked simultaneously -- usually one to three. If glass or a high temperature (200 C) translucent plastic is available in 0.5m x 0.5m sheets or larger, it is estimated that a cooker could be made for 750 to 1000 shillings.

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APPENDIX A

QUESTIONNAIRE FOR PRODUCERS OF WOOD AND CHARCOAL STOVES-PART 1

1. Name _____ Date _____
2. Location _____
3. Production type ceramic _____
Metal _____ soapstone _____
4. General description of stoves made (size, shape, other distinguishing features)
 - a. _____
 - b. _____
 - c. _____
5. Raw material
 - a. Type (brief description if possible) _____

 - b. Location _____
 - c. Cost _____
 - d. Problems encountered (availability, competition, location, cost, etc) _____

6. Tools, equipment and supplies
 - a. Type (brief description if possible) _____

 - b. Location _____
 - c. Cost _____
 - d. Problems encountered (in use, availability, quality cost, etc) _____

7. What other problems do you have with
 - a. Making stoves (labour, weather, transport etc) _____

 - b. Selling stoves (transport, lack of customers, etc) _____

 - c. Other problems _____

8. Could you sell more stoves if you did not have these problems? Yes _____ If yes how many more stoves could you sell each month _____ or week _____
If no _____ why not _____
9. How many hours _____ or days _____ does it take to complete a stove?

APPENDIX B

QUESTIONNAIRE FOR RETAILERS OF WOOD AND CHARCOAL STOVES - PART 1

1. Name _____ Date _____
2. Location _____
3. What type of stoves do you sell _____
4. From whom do you buy stoves and where are they located?

Buy stoves from Location

- a. _____
- b. _____
- c. _____
- d. _____

4. Do you go to the stove makers to buy stoves? Yes _____ No _____
If No, how do you get them to your shop?

-
5. How many stoves do you buy at a time _____
 6. How many stoves do you sell each week _____ or month _____
 7. What characteristics do your customers want or look for in stoves they purchase from you? _____

8. Do you want to sell more stove? Yes _____ No _____

9. What could be done to help you sell more stoves? _____

10. What prevents you from selling more stoves? _____

11. What improvements in stoves could help you sell more stoves? _____

12. Do you sell more stoves at some times of the year than others? Yes _____
No _____ If yes why _____

13. What are the government or other laws or regulations which you must follow to sell stoves?

14. Which stoves do you feel are the best? _____

Why? _____

15. Who buys most of your stoves? women _____ men _____ Why _____

16. About how long does a stove last before a new one has to be purchased?

17. What is the price of your stoves _____

18. How has the price for stoves changed in the last year? Why do you think it has changed? _____

APPENDIX C

QUESTIONNAIRE FOR RETAILERS OF WOOD AND CHARCOAL STOVES - PART 2

1. Name Date

2. Location of retailer

3. Types and size of stoves sold by retailer

Type	Size	Price
------	------	-------

a.

b.

c.

d.

4. Where do you purchase the stoves from?

5. What is name of producer?

6. How often do you buy stoves from the producer?

7. How many stoves do you buy from the producer each time?

8. Do you purchase the same amount of stoves each time?

Yes

No

If no why?

9. How are the stoves transported to your shop?

10. How much does it cost to transport stoves?

11. Do some stoves break during transport?

Yes

No

If yes about how many?

12. Why do you think they break?

13. How do you package to avoid breakage?

14. How can the breakage of stoves be reduced?

15. How many stoves are sold each week or month?

Type	Size	Number sold
------	------	-------------

- a.
- b.
- c.
- d.

- 15. Why do you think you sell more of certain stoves than others?
- 17. Do you sell more stoves at some times of the year than other time?
- 18. How long do you think a stove will be useable or last?
- 19. What special or extra things do you do to help sell stoves?
- 20. What other products do you sell?
- 21. Which products do you sell most?
- 22. Which products do you not sell so many of?

APPENDIX D

INFORMATION FROM TECHNICAL SCHOOLS IN MOGADISHU

1. Contact person Date
2. Title
3. School name
4. School location
5. General types of facilities and expertise at the school
6. Has school done work for outside agencies? If so what was it?
7. Would the school be able to assist VITA in carrying out some prototype development, testing and training of craftsman?
8. What is procedure to get approvals to get work done there?
9. How do we implement work and what would you like to see VITA provide? (materials, funds, etc)
10. Do they have suggestions for the following:
 1. Persons who would be interested in helping in prototype development
 2. Craftpersons to build stoves to VITA specifications.
 3. Persons who would want to get training or give training in stove making.

APPENDIX E
TEST MARKETING PROCEDURES FOR CERAMIC STOVES

INTRODUCTION

Test marketing is the controlled marketing of a product, in this case a ceramic stove, or service in a selected location which is representative of total market existing for producers. The test market must represent what will be done when selling to the market in the future. This applies particularly to price and incentives, product characteristics and features, promotions and distribution.

There are two reasons to conduct test marketing.

1. To allow VITA to gain information and experience in having people produce and sell stoves before a larger sales promotion program is started.
2. To help predict what may be the best way for the production and sales to take place so increased profitable sales are obtained.

The test market procedure described here should be carried out for 30 days or less. If sales are poor due to the stove's characteristics, pricing or promotions, then test marketing should be stopped until the problems are solved to the satisfaction of the VITA Director.

SCOPE OF WORK FOR TEST MARKETING

- A. Work with at least one producer of ceramic stoves to provide technical assistance and training to build improved stoves and to learn new techniques.
- B. Work with one retailer of ceramic stoves to help locate the producers in (A) above, provide technical assistance and training on stove demonstrations and using other promotions to sell improved stoves.
- C. Monitor transport of the traditional and improved stoves from producers to retailer to fully understand the process including costs and breakage.
- D. Monitor all sales of improved stoves and make daily recordings and reports of progress as shown in the procedures section of this appendix.

TEST MARKET PROCEDURE

VITA extension staff will use the following procedures to conduct the marketing of ceramic stoves.

- I. LOCATION: The initial test market will be done in the town of Doryoley so as to sell to people mostly there and to refugee camps

near Doryoley.

II. PRODUCER RELATED PROCEDURES

A. Choose one producer who has skills, facilities, and interest to make stoves. This producer should be near Doryoley (Merka or closer) and should have made stoves for retailers in Doryoley before.

B. Determine if the producer is interested in making stoves to VITA specifications. Show a model of the stove so producer has clear understanding of what type of stove VITA wants made.

C. Explain how VITA will help them make stoves but all stoves must be to specification. Stoves will be purchased by a retailer not by VITA.

D. Determine what the producer feels the price will be after VITA explains the first few orders are for test marketing to see if customers want to buy. Do not get a quote but explain the final price will be determined by the retailer and producer. Also explain that VITA is NOT buying the stoves but only offers free assistance to make and sell the stove. The price should be the same or less than traditional ceramic stoves the producer now makes.

E. Both a VITA production and extension staff person VITA will be physically present with the producer during production of all test market stoves to:

1. Show how stoves are to be made. Scratch or mark a production location, date, and number on each stove so as to help in monitoring later during sales. (For example, all stoves made in Merka will have an "M" and a number 1, 2, 3... etc depending on the order in which they are made.)

2. Make sure all stoves are made to specification and to explain reasons why certain specifications need to be maintained. This is the start of the quality control program.

3. Learn new and improved ways to make the stoves so this knowledge and experience can be passed on to other producers. VITA staff must be open to learn as much if not more than they teach about making stoves and working with clay. Specifications must be maintained unless producer demonstrates that an improvement or change will not hurt fuel efficiency, strength and other functional characteristics.

4. Bring the retailer to the producer to agree on a price, place an order and purchase the stove when completed. All business will be between producer and retailer. VITA will not be involved other than to clarify what VITA will do and to record how the price and order was agreed upon between producer and retailer.

III. RETAILER RELATED PROCEDURES

A. Contact a person in the Qoryoley market place who is an established retailer of ceramic stoves. The test market location must be a place where the VITA extension staff can easily monitor the sale, use and problems with the stoves. Being able to control the test market conditions allows the following.

1. keeping track of who buys the stoves and to provide follow-up sales service to customers and the retailer.
2. transport and other organizing to be done for test marketing is easier.
3. contact with a larger market is limited where other factors are not as controllable. If the test market fails the larger market has not been influenced as much also.

B. Determine if and why the retailer is interested in selling the stoves. Show and demonstrate the stove so the retailer is familiar with the stove, its features and why it would be to her or his interest to sell the stove.

C. Explain how VITA will help the retailer by:

1. Locating a producer and facilitate the contact with the producer at the production location.
2. Doing demonstrations and training directed at the retailer so they are very familiar with the stove and can demonstrate it effectively to customers. This training will start at least one week before the stoves are delivered to the retailer so there is time for the retailer to prepare and practice demonstrations. A VITA extension staff will be available during all demonstration, training and practice sessions. The two women seconded to SCF, Maryam and Cadar, will be the primary persons who will train the retailer and assist in promoting the stove in the marketplace.
3. Allowing all profits to go to the retailer. Explain that all business dealings are between the retailer and producer. VITA will not buy stoves from producers or sell for the retailers.
4. Purchasing all stoves from her which do not sell within 30 days after they have been delivered to retailer from producer. This will be done if stove sales are below established goals.
5. Refunding money or replacing stoves to customers who have problems with the stoves and VITA extension staff feel the problem is related to the stove and not to misuse by the customer.

6. Monitoring all sales, uses, problems and solve problems where possible which the retailer or customer have.

7. Monitoring transport of stoves to retailer and replace any stoves broken in transport.

D. Explain what VITA would like the retailer to do such as:

1. Determine the price to be paid to the producer for the stove during discussions with the producer. VITA will not determine price.

2. Pay transport costs as normally done by the retailer.

3. Allow VITA extension staff to help her sell.

4. Keep all profits and will cover other costs the retailer normally has in selling stoves.

E. If retailer agrees to C and D above help retailer make first contact with producer by providing transport to and from producer.

F. VITA records all discussion between producer and retailer as to how price was arrived at, the price, other terms such as delivering time and other comments about the stoves.

IV. OTHER VITA EXTENSION STAFF PROCEDURES

A. VITA to monitor transport of stoves to market place and will pay for any stoves broken. Record how stoves were packed, loaded, handled how broken and suggestions on how to reduce breakage. Also determine normal amount of breakage for traditional stoves. Durability of the improved stoves will be very important and must be monitored very closely. VITA can also test new packing, loading and handling methods.

B. To set up demonstration and training site at market place and make sure retailer has complete familiarity with function, use, advantages and disadvantages of the stove. Record her comments about the stove and any problems which happen and how they were solved.

C. Demonstrate stoves to potential customers and point out fuel savings in addition to other important features especially that the stove is locally made and not an FHI stove. The demonstrations will show advantages and uses compared to traditional stoves and must be easily and quickly seen and or experienced by customers. Allow the retailer to do as much of the demonstration as possible. VITA extension staff are there to help retailer sell not to sell the stoves.

D. Offer a 30 days trial period to interest customers in using the stove. If they not satisfied after 30 days they can return stove for replacement or money back. Try to get customer to take a replacement of stove. Get information from the customer (the person who actually used the stove) why it do not function properly and record that information. Also record data of purchase and return date, purchaser name and stove number and code which has been scratched on bottom of all stoves when they were made.

E. Record comments from potential customers regarding the perceived advantages disadvantages, price, uses etc. of the stove demonstrated. Also determine what influenced them to buy a stove and especially the improved stove.

F. Go to homes of customers, if possible, to monitor uses, problems and solve problems were possible. This will be done once a week during the 30 days after purchase.

G. Evaluate the test market activity with the retailer and determine if they will continue to sell the stoves. If so why? If not why not? - try to overcome problems report findings.

INDICATORS TO SHOW SCOPE OF WORKS IS ACCOMPLISHED

1. One or more ceramic stove producers will be located who can make stoves to specification.
2. One retailer will be located in Doryoley.
3. At least 20 stoves well be ordered on initial order by retailer. Additional stoves will be ordered as needed by retailer.
4. 50% or more of all stoves sold by retailer will be of the improved type by end of the fourth week of sales by retailer. If this goal is not achieved, then discuss results with the Project Director to define and resolve problems.
5. Weekly records and reports will be submitted to VITA Director on specific steps followed, progress made, problems and how problems were solved.

APPENDIX F

GUIDELINES FOR METAL STOVE PROTOTYPE DEVELOPMENT AND PRODUCTION METHODS

As many as possible of the following features need to be included in any metal stove design

1. Be portable
2. Able to save or keep charcoal embers
3. Can produce small and moderate amounts of heat
4. Produces very little waste heat particularly from the sides.
5. Low fire and burn hazard potential
6. Reduces cooking time
7. Reduces fuel consumption
8. Use different types of fuel, especially wood and charcoal.
9. Has good appearance
10. Is durable and easy to maintain and repair
11. Not easily knocked over or has low center of gravity
12. Can be raised off ground when it rains
13. Can utilize different size cooking pots and use canjero pan
14. Can burn incense and provide some light
15. Is easy to ignite and maintain ignition
15. Easy to learn how to use correctly
17. Comparable or lower in cost to traditional stoves.

The following assistance is needed to develop an fuel efficient metal stove to be made by metalsmiths in Mogadishu and elsewhere.

1. List of materials to use regarding thickness, size, type, etc based on what is available in Somalia.
2. Description of methods to produce stoves so maximum use is made of the metal purchased and waste is kept to a minimum.
3. Templates or sketches of these to measure metal for bending and cutting.
4. Description of tools which are needed, location and/or ways to make them.
5. Description of ways to mass produce stoves using assembly line methods to reduce production costs.
6. Suggestions on metalsmiths or others who would be interested in learning how to make metalstoves and sell them.