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REGIONAL WOOD ENERGY DEVELOPMENT PROGRAMME IN ASIA
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REPORT

**REGIONAL COOKSTOVE PRODUCTION
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PLANNING AND MANAGEMENT OF SMALL COOKSTOVE PRODUCTION CENTRE

by

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Before discussing the task of planning of production of stoves it is appropriate to discuss the broader conceptual framework within which the production function has to operate.

Broadly speaking any programme whether it be a service oriented or production oriented are made up of two sub-systems.

- (1) Identifies the need and transfer "that which" satisfies the needs of the consumers.
- (2) Produces "that which" to be transferred to satisfy the needs.

The former is commonly referred to as marketing function and the latter as production function. There is close relationship between these two sub-systems. The closer they are the higher the degree of success. Any attempt to isolate these two functions from one another can adversely effect the progress of the programme. However for purpose of analysis and clarity. These are discussed separately but keeping in mind they are inter dependent.

The main task of the production function is to manufacture a preidentified item. Manufacture has to be done,

- (1) in the right quantity,
- (2) at the right cost,
- (3) of the right quality and
- (4) at the right time.

These are the four important objectives of the production function. To achieve these objectives the production function incorporate so many diverse tasks which interacts in so many ways. These have to be considered in conjunction with the financial, fiscal, political and cultural constraints imposed by the environment within which the production has to be carried out.

The major task of the production can be subdivided into 4 stages,

- (1) Policy stage,
- (2) Planning stage,
- (3) Manufacturing stage and
- (4) Post manufacturing stage.

The task and decision in the policy stage which is the first step of the production function have to be carried out by policy makers of the organisation. However these decisions guide and influence the next three stages which are the responsibility of the production manager.

The design, market and the production strategy are generally policy considerations and depend on R&D activities carried out previously and on the objectives of the implementing organisation. For example if the implementing organisation is oriented towards community development, the design may prefer a chimney stove or a multi pot stove which helps to improve the health standards and dissemination is concentrated in rural areas.

The factors identified below under each subheading interact with each other and also imposes certain amount of restriction on the actions and decisions of the production manager so that any long term objectives of the implementing organisation are not effected by short term solutions that need be taken in the planning and manufacturing stages.

Policy Stage

Design elements of the stove,

- (a) Clay, metal or both
- (b) Grate, chimney
- (c) Single pot or multi pot
- (d) Directly used or to be insulated
- (e) Dimensions

Market

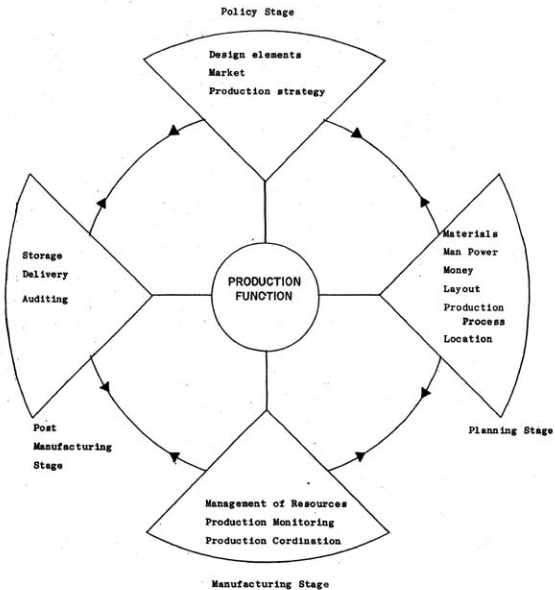
- (a) Size
- (b) Nature (urban and rural)
- (c) Concentrated or dispersed
- (d) Fixed or variable

Production Strategy

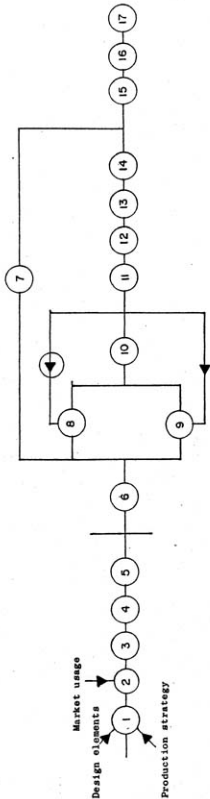
- (a) Informal or formal sector
- (b) New production unit
- (c) Existing industries

Planning Stage

- (a) Manpower resources
- (b) Material resources
- (c) Financial resources
- (d) Production process
- (e) Layout
- (f) Building and equipment
- (g) Location
- (l) Traditions
 - i. Throwing, coiling,
 - ii. Moulds,
 - iii. Mechanised.



ACTIVITY CHART
PLANNING & SETTING OUT OF COOKSTOVE PRODUCTION CENTRE.

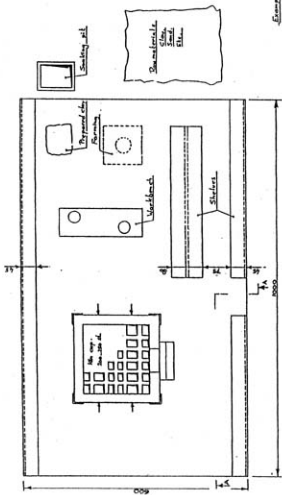


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|---|--|
| <p>01. Establish Production Process.</p> <p>02. Establish layout & Organisation.</p> <p>03. Assess requirements of building & equipment</p> <p>04. Assess requirements of resources
(Manpower, Money & Material)</p> <p>05. Work out cost of production.</p> <p>06. Initial Preparation</p> <p>07. Commence building work & order equipment.</p> <p>08. Clay testing.</p> | <p>09. Training of staff</p> <p>10. Trial production</p> <p>11. Review production process</p> <p>12. Review production economics</p> <p>13. Pricing</p> <p>14. Establish quality control methods</p> <p>15. Manufacture</p> <p>16. Quality control</p> <p>17. Storage.</p> |
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Phase I Action Plan - Production

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1. Production Planning	—									
2. Set up initial production			—							
3. Clay body testing		—								
4. Training, trial production and pricing		—								
5. Establish quality control standards		—								
6. Brand name and identifications		—								
7. Review production economics				—						
8. Review methods of production				—						
9. Plan improved production				—						
10. Set up new production systems					—					
11. Commence production in New Factory 1										
12. Fully commission Factory 1										
13. Look for Factory 2										
14. Training Factory 2										
15. Production Commissioned Factory 2										
16. Review progress No. 2										
17. Plan expansion No. 2										
18. Construct New Factory 2										
19. Commence New Factory 2										

Examples of Plan Lay out for Stove Production

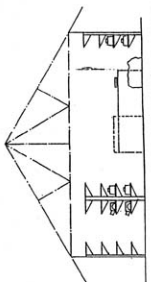
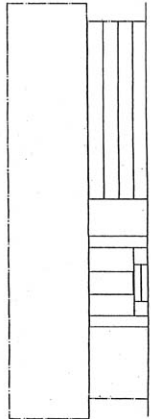


Dimensions
 1000
 600
 15

Detail of shelves and supports

Dimensions

Example of layout for a workshop for manufacturing boxes 50x100x30 type
 Capacity approximately 200 boxes per week with 3 persons (skilled)



Manufacturing Stage

The production process can be divided into the following sub processes.

- (a) Clay preparation
- (b) Forming of components
 - (a) Throwing, coiling (traditional methods)
 - (b) Using moulds
- (c) Assembly of components
- (d) Finishing
- (e) Drying
 - (a) Slow
 - (b) Fast
- (f) Firing
 - (a) Slow
 - (b) High

Clay is obtained from various sources. Hence the quality can vary depending on place where it was obtained. This is a difficult problem in the case of rural production where supervision is minimal due to dispersed nature of production and inability to provide a quick solution to the problem of long clay testing procedures. Often when the test results are made available potters are using different clay taken from some other sources.

The task of forming the stove body needs skilled throwing of large components and semi skilled production of small components such as pot rests, butt rest, baffle etc. The thrown components required for the stove are much more difficult to make than in the case of traditional forms such as pots where the final shape is obtained by paddling after throwing. This is not possible in stove making where the final dimensions after throwing have to be exact and consistent to achieve the desired thermal efficiency of the stove. Besides, the large component which need to be thrown, each stove has a number of small components which must be formed and added to the main body. The dimensions of these too are very critical for good stove performance. Yet to effectively train people to make them by hand is not virtually possible. Press moulds can be made use of to make these small components so that clay could be simply pushed into the moulds and then removed to obtain the correct shape and size. Extensive care has to be taken when assembling components to see that all components have the same moisture content. If one component is drier than the other cracks can develop at the joints which will cause the whole stove to be discarded. Therefore high level of coordination of throwing, press moulding and assembly activities is required.

Usually throwing is done by skilled potters. For press moulding high level of skill is not required and therefore unskilled personnel are trained to perform press moulding, assembling and finishing activities thus cutting down on labour costs. In the case of the Sri Lankan 2 pot stove, 4 unskilled people are required for 1 potter to produce 25 stoves a day.

One of the major and important activities in the production of stoves is the quality control inspection. This is done at four stages in the

production process. The formed parts after moulding or throwing, the freshly assembled stoves, the kiln ready stoves and the fired stoves. The different aspects of the stove quality are checked at each stage. The stoves rejected at the first three stages are recycled into the clay supply and the rejects after firing are used as grog in the clay mixture.

It is clear that stove production requires a combination of traditional and modern methods. No one particular method should be selected as 'prior'. It is necessary to experiment to see which combination of methods or method is the most appropriate given the circumstance and resource. Each has advantages and disadvantages in their own way. While throwing requires high skill, yet it is difficult to maintain consistency. The moulding methods too have drawbacks. The complexity of the design does not allow the stove to be moulded in one piece. It requires several components to be assembled. Upon removal from the mould, the stoves are subject to distortion much worse than encountered in traditional methods. The moulds are complex and are not durable, thus requiring replacements, very often making their use expensive.

In as much as the technical factors, one must not lose sight of the non technical factors involved in the manufacturing stage. Proper management of resources namely men, materials and money are as crucial as technical factors. This is necessary to keep the cost of production low and for continuity of production. Very often poor labour relations can disrupt production activities even resulting in complete stoppage.

Training of personnel require considerable amount of time, effort and money. Once a person is trained every effort must be made to retain his/her services as replacement may not be possible within a short time. One member of the production team leaving the project can have adverse effects on the programme.

Specialisation of labour is also important for efficient production and to reduce the cost of production. Often potters have been used in moulding components in which a semi skilled person can also perform at a lower cost.

Decision on labour wages is a crucial factor. It has to be decided whether daily or piece rate wages is to be given. This depends on whether production is done on regular or variable basis. If the production is to be regular a piece rate is preferred and if the production is variable, the daily wage is preferred. However when fixing piece rates it must be remembered that the output will considerably increase with the gaining of experience.

The rate cannot be reduced at later stage when the output is increased which will result in piece rate workers getting disproportionate income compared to daily wage makers, thus, leading to labour disputes. In fact this has happened in the Sri Lankan Stove Programme where piece rate unskilled workers earning more than the skilled potters working on a daily wage.

One way to overcome this is to give an allowance during the training period so that a realistic assessment of output can be made at the end of the training period.