Shedding new light on the marketplace

Last year *Appropriate Technology* readers learnt about a new project to develop an affordable solar lantern for use in rural Kenyan homes (IT News, in Vol.24 No.4) The lantern works by using sunlight to charge a battery during the day, which then powers a lamp after dark. Using a combination of high-tech, rapid prototyping techniques and low-tech, group participation market surveys, IT Consultants (ITC) hope to come up with a product that is tailor made for Kenyan customers.

In its first year the project has focused on exploring technology options for the lantern, strengthening links with manufacturing partners and carrying out market research to find out exactly what Kenyan householders want.

Market research

In order to develop the lantern effectively, the project team decided to carry out market research in two important stages. The first stage (already complete) set out to determine which aspects of existing Solar Lantern designs were favourable to potential customers. The second stage will use working prototypes (designed with the results of the first survey clearly in mind), to gauge customers' reactions to the new design.

Market research must take careful account of peoples lifestyles and cultural backgrounds. This is particularly important when dealing with communities in rural areas where conventional research techniques can easily fall short and yield wildly inaccurate results! Official-looking characters with clipboards, nametags etc.. can be intimidating and often result in the respondent giving the answer that he or she thinks the facilitator wants to hear, rather than one which is a true reflection of their feelings. It is often necessary to spend some time talking around the subject and making the respondent feel comfortable before asking detailed questions

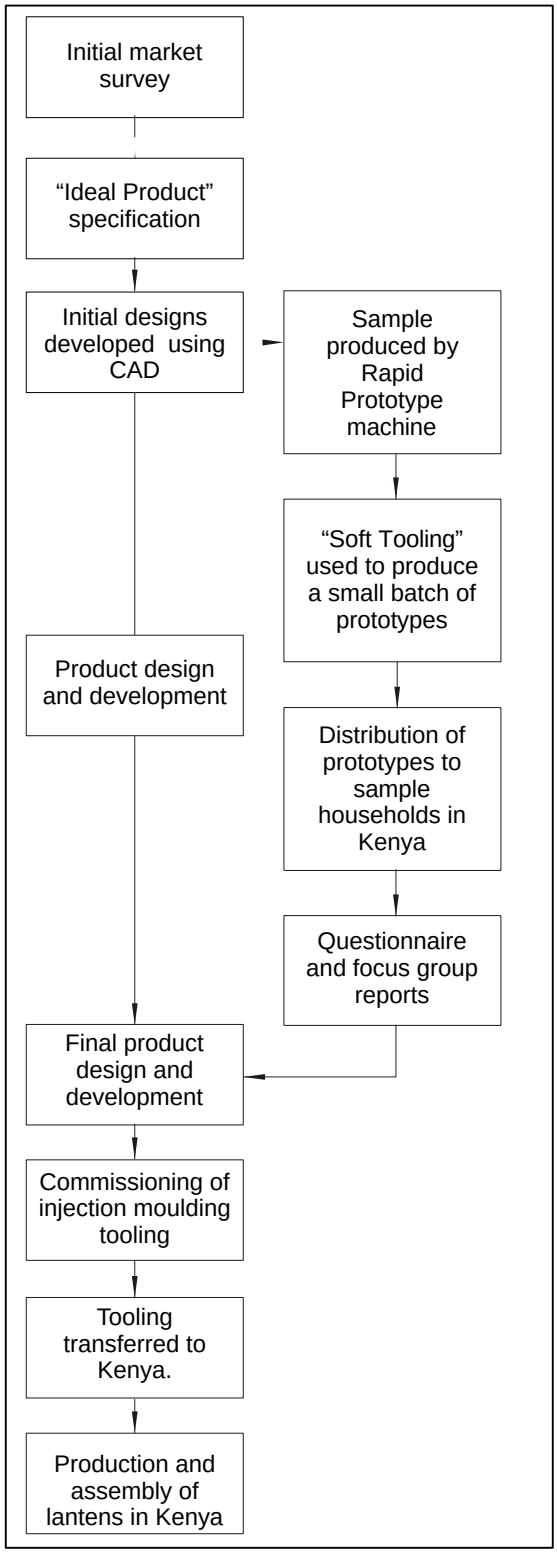
Bearing this in mind, a number of studies have been carried out in Kenya by ITC project partners Energy Alternatives Africa. These studies tried to identify which aspects of existing solar lantern designs are favourable to potential customers.
Focus groups were used to measure reactions to particular design details and to stimulate more general discussions, where participants could discuss lighting and develop their responses to the questions they were being asked. Detailed results from question and answer sessions were recorded on paper while more general feedback from discussion groups (which often contained interesting and unexpected information) was recorded on tape for analysis later. It was found during the discussion group that the eight hours a day of lighting that people had said was desirable on their questionnaire was too high; discussants agreed that four to six hours was a more realistic goal. In addition, the respondents had said that they would be willing to pay about KSH.500 for a lantern unit- a price much too low for viable commercial production. On discussing it in a group, the same respondents changed their price expectations to a minimum of KSH.2500.

Fine-tuning technique

As well as gathering important design data, a number of interesting lessons have been learnt which may serve as important pointers in future surveys of this type.
The team discovered that survey groups which were well balanced – women and men, people on low incomes and the better off - helped to engender an atmosphere where everyone felt comfortable about having their say. These groups tended to yield more accurate results than those where the discussion was dominated by a few knowledgeable individuals.

The location and time of day for group surveys was also important. Holding a survey after dark might at first seem to be the best way of demonstrating lanterns and their important characteristics to customers. In practice the team found that in rural areas with no street lighting, finding participants (women in particular) who were willing to travel from home at that time was very difficult

Participants drawn from slightly higher-than-average income groups are easier to approach and interview, but their spending patterns can differ greatly from those of customers from the lower income households at whom the new products might be targeted. It is often difficult to collect accurate information about how much a customer is willing to pay for a new product, especially in communities where bargaining is part of everyday business. The question “how much would you pay?” when asked directly is more likely to lead to a heated exchange than yield any useful information! Asking instead how much the participants friend or relative might pay, helps to depersonalise the question and discourages haggling.



The market research and testing programme was carefully planned

As a result of the initial focus group study the project team were able to come up with a concise description of the "ideal lantern".
The most important features were identified were as follows;

Service characteristics;

- The maximum price of the lantern should be no more than $75
- The lantern should provide light for up to 4 hours each evening.
- Customers should have access to affordable and readily available spares
- Customers expect an overall lifetime of the lantern of 6 years
- Customers expect a 12 months warranty for the product

Design characteristics;

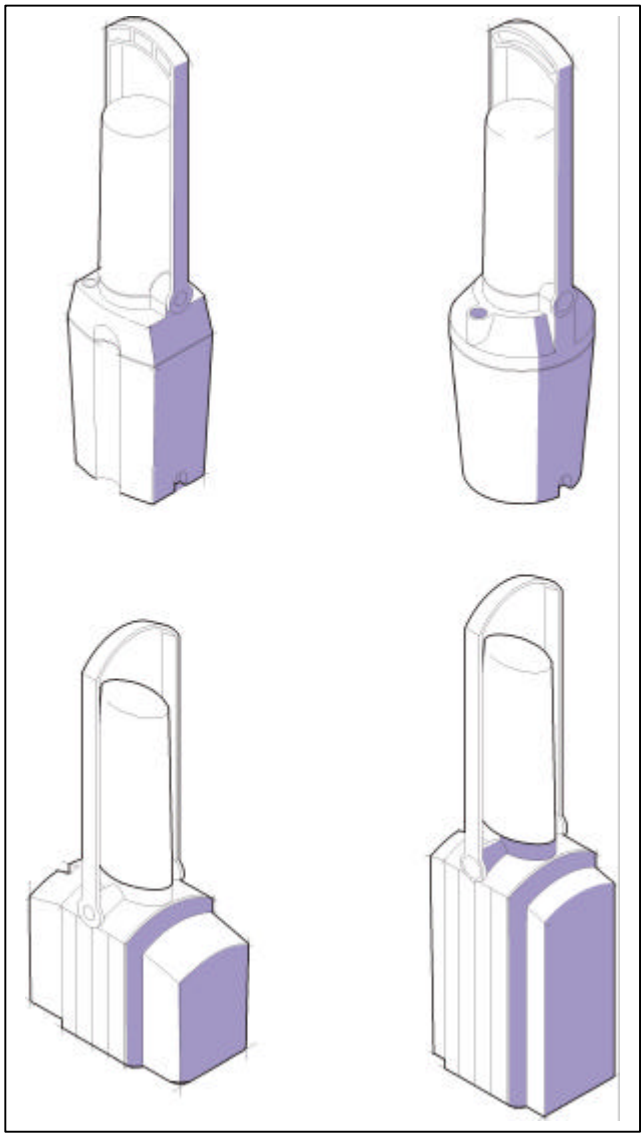
- The lantern should spread the light over 360°.
- The bulb enclosure should allow maximum transmission of light.
- The carry handle should be sturdy and comfortable.
- The preferred choice of bulb is a 5W CFL (compact fluorescent tube lamp)
- The lamp should be portable and weigh no more than 2.5 kg.
- The lantern should be stable with a good base.

Some of the extra features that potential customers expressed a need for were;

- An indicator to show that lamp is charging,
- A warning light to show that the lamp is about to switch off when the battery is low,
- A power socket to allow a small radio to be connected to the unit.

Rapid Prototyping

The findings of this initial survey were used to create a design brief, and from that the team has produced a new design for an injection-moulded lamp which incorporates all of the popular features.
(It is vital during the development of any new product to show customers a sample and to listen to their ideas about it. This is especially important if fully-fledged production involves substantial investment in terms of tooling and machinery, as any alterations will be time-consuming and costly.)
Until a few years ago, the only samples that designers could make for new



The results of the research were used to develop prototypes

injection-moulded products were “block models”. These were constructed by hand from wood and plastic and although they had the appearance of the final product they could not normally demonstrate any of the working characteristics. Today, computer aided design (CAD) software combined with rapid prototyping techniques and “soft-tooling” allow the designer to realise his new design in a matter of hours. (Soft tooling is a process which produces a plastic model of the product, which is then used to produce a rubber mould. The rubber is of course much softer than the hardened steel that will be used to produce the final tool, but the cost of the soft tool is much lower, hundreds of pounds compared with tens of thousands, but its life is much shorter – a rubber tool may produce twenty components, whereas a hardened steel tool can produce up to one million.) A computer generated “electronic model” which contains all of the physical information about the size and shape of the new product is fed into a Rapid Prototype machine. The machine uses a filament of plastic and a moving nozzle to lay down successive layers of material (rather like icing on a cake) which are built up to produce a plastic replica of the design. A soft silicon rubber mould, which is created by pouring liquid rubber around the original and allowing it to set, can then be used in turn to produce a small batch of products.
This technique allows the designer to assess his design very quickly and more importantly allows marketers to obtain feedback from potential customers, all before any significant tooling costs have been incurred.

The Solar Lantern project team used the facilities at Coventry University to produce a “rapid prototype” of the new lantern. This will in turn be used to produce a small batch of sample lanterns that will be market tested in sample households in Kenya. This phase of research which will be used to measure customers’ reactions to the new lantern design, has been designed by project partners International Development Enterprises working closely with IT staff in Kenya. Fully working, prototype lanterns will be distributed to sample households where they will be used for a period of one week. Facilitators will then visit households and use a simple questionnaire to measure customers reactions. In addition, selected members from each household will be gathered together to form focus groups where information will be gathered through more informal discussion about the lanterns.

The feedback from the sample household tests will be used to make any necessary adjustments to the prototype, and then the next stage will be to commission tooling for the injection-moulded components. It is likely that these will be produced in UK and then shipped to Kenya where the moulding and assembly of the lanterns will be carried out by locally appointed companies. The lanterns will be sold by rural sales people supported by an existing network of battery service stations and by electrical retailers.
The ultimate success of any new product introduced into the marketplace can be measured through sales figures. Initial estimates indicate a potential market for over one million units in Kenya alone if cost can be kept low.

IT expects to use the experience gained in Kenya to explore the potential for

solar lanterns and in particular this type of technological collaboration for product development in other countries of the South.

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