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Needs and Problem Statement

Our project team consisting of five University of Ottawa students was recently tasked with the development of a way to grow fresh fruit and vegetables in a desert climate. We recently had the opportunity to meet with someone who would be able to provide more insight into the requirements of such a device designed specifically for individuals in refugee camps. The gentlemen that we met with, Mohammed Ali, is a very well educated man who practiced medicine in Syria. Due to war, Mr. Ali was forced to leave his country and become a refugee. For three years he lived in a refugee camp located in Jordan, and is very passionate about improving the living conditions for others who still reside there. From the time we spent with Mr. Ali we were able to construct a list of needs that our team believes are relevant to the implementation of a growing system.

Needs:

1. Low Cost
2. Durable in the climate
3. Low water usage
4. Low power usage
5. Protected from pests
6. Temperature controlled
7. Not affected by poor soil conditions
8. Produces Quality vegetables
9. Easy to use
10. Low maintenance

Establishing what needs have top priority is an important step in the design process as some compromises might have to be made for a realistic solution. The needs listed above can be generalized into four groups; cost, resources, environment, and use/maintenance.

From analysing all the needs, it has been deduced that the cost of the system is of highest importance. In the refugee camps there is no form of currency; items are obtained only through trading amongst the refugees. For this reason it is unacceptable to assume that the refugees would be the customer for a solution to their crop crisis. The refugee camp heavily relies on the resources brought to them by global aid organisations such as red cross. It is assumed that these organisations are limited by finite funds to aide in the cause. For this reason the price of the product must be relatively low cost (with respect to their budgets), for the organisations to feasibly afford it.

The second most important need is that the system must be able to run effectively with the resources available in the refugee camps. This generalisation incorporates both needs 3 and 4 from the list above. As the camp is located in a desert, access to water is only available through monthly shipments from the aid organisations. Each family is given one barrel of water (waist high), which they must use for all needs.

As water is a scarce resource, the crop growing device must be extremely water efficient. The other limiting resource is the camps lack of electricity. The only access refugees have to electricity is through small windmills attached to their camps, which they use to charge a battery. The crop growing device is therefore limited to the electrical potential of a moderately sized battery. Although cost is the most important factor to consider for the design of this device, it is clear through the reasons explained that accounting for the resources available is of next highest importance.

The third most important factor which is of lesser importance, is that the system needs to be durable enough to withstand a variety of different things like pests, temperatures as high as 40 celsius during the day or as low of 0 during the night, and sandstorms. This was ranked in the bottom two because Ali said that pests or sandstorms are not a big issue for the refugees when growing crops, but we still need to take these things into account because the pest levels could increase and or the sandstorms could come more frequent and be more severe.

Ease of use, and maintenance of the system are also important factors to consider for this project. Through the interview with our client, we discovered that many people residing in the camps are highly educated, however, this does not mean that we are to design a difficult to maintain and hard to use system. The system we design should be simple to use and maintain for not only the educated members of the camps, but also the less educated. The system should also be simple enough for children in the camps to use. During the interview we also found out that keeping busy with routine tasks is a good way to pass the time, and we believe that by giving the children of the camp responsibility over some units will give them a sense of helping, and boost morale. The growing system should be very water efficient as to not require filling as often, and it should be a closed unit aside from the components that require regular maintenance. Any tools and instructions that are needed for use and maintenance should be readily available in the unit.

With all of the above needs identified by talking with the user Mr. Ali, a comprehensive problem statement has been developed to encapsulate what our team is attempting to achieve. Our team sets out to develop a cost effective crop growing solution that can be implemented and utilized by individuals living in areas that do not promote the natural growth of vegetation. The crop growing solution will be utilized by a population that is under economic duress and as such water usage, power requirements, and material availability must be taken into consideration.