emPOwering women – Protective lock + the light is On + switch On the alarm

Solution Overview :

This is a design proposal for the locking, lighting & emergency alarm system for toilets in refugee camps, especially for women and girls who are more prone to abusive and voyeuristic activities. The uniqueness of this design is that the locking, lighting and emergency alarm system are designed from user's perspective and human mind. They are designed to empower women and girls to signal for help and to defend for themselves under emergency circumstances. Self-help is critical before others come to help.

There are three components in this design proposal, namely :

Locking : “ Protective lock ”
Lighting : “ the light is On ”
Emergency Alarm System : “ switch On the alarm ”

Detailed description of proposed solution :

Locking : A protective lock that is unusually large is designed as the locking mechanism for toilets in refugee camps. It measures 33 cm in length. It is thought that such a large lock offers a sense of security and peace of mind to women and girls when they are inside the toilet cubicle

By lowering down the lever of the protective lock, one securely locks the door. It is that simple and intuitive to use.

In case of emergency (when an intruder or peeping tom is felt to be present outside the toilet cubicle), woman or girl inside the toilet cubicle can hold the handle of the lever and press it down to further secure the toilet door from being knocked / pulled open by the intruder. The length of the lever (approximately 30 cm) provides the woman or girl with a substantial leverage against the intruder's muscle power.

A protective lock with a longer lever (more than 30 cm) is also possible if the budget allows for it.

The “Protective lock” empowers women and girls to protect themselves against toilet intruders!

Lighting : A unique lighting is designed for toilets in refugee camps. The light fitting is long and suspended from the ceiling. It is basically a strip of LED lighting inserted into a clear PVC flexible hose. Part of this flexible hose is coiled around an O-shaped ring where the dimmer for light and panic button for alarm are provided.

The uniqueness of this lighting lies in its length and flexibility. Being suspended from the ceiling and at a height of approximately 80 cm above the toilet floor, the O-shaped ring (with dimmer and panic button) can be easily reached by hand.

With the substantial length of the flexible hose with LED strip lighting, the toilet cubicle will be sufficiently lit up, while the user is able to adjust the light intensity via the dimmer. The light will be switched on automatically via a motion sensor installed inside the O-shaped ring. When someone enters or leaves the toilet cubicle, the light is switched on and off automatically.

This lighting is also designed to empower women and girls to signal for help under emergency circumstances. The long & flexible lighting hose can be swung in all directions, and as such it creates a swinging light effect which attracts the attention of people nearby. This swinging lighting effect is a highly noticeable emergency signal especially during night time, when the likelihood of intruder or peeping tom being present outside the female toilet is higher.

“the light is On” is designed to provide both lighting and alarm system to empower women and girls in refugee camp toilets. The lighting is powered by solar panels and is automatically switched on or off, while it is also dimmable. Its ability to be swung to create a swinging lighting effect as an emergency signal gives it an

additional role on top of its main function as lighting.

Emergency Alarm System : As elaborated earlier, an emergency alarm system powered by solar panel is created in the O-shaped ring which is also a component of the light fitting. In case of emergency, one presses the panic button on the O-shaped ring to activate the emergency alarm. The alarm sound is a familiar signal calling for help and will be responded to in a timely manner. This emergency alarm system (sound) can be complemented by the swinging light (sight) and together they form a highly noticeable emergency signaling system.

In the event that the cost of an emergency alarm system (with a panic button) is beyond the overall budget per toilet cubicle of $20 USD (together with the lock and light), a simple alternative alarm system is proposed : a ring bell which can be fixed on the O-shaped ring. One simply presses the ring bell to signal for help during emergency.

“switch On the alarm” empowers women and girls to not remain silent when they are at risk of being assaulted / peeped at.

All the components in this design proposal are intuitive to use and are assembled using affordable common materials (stainless steel ironmongery, plastic extrusion, PVC flexible hose, dimmable LED strip lighting, plastic casing, electronic circuit board, wiring, alarm, ring bell, etc) to be fabricated or sourced in the region as much as possible.

Solar panel (to be shared with other facilities in the refugee camp) is the power source for the proposed light and the emergency alarm system. If budget allows, solar panel can be used exclusively for powering light and emergency alarm system for a substantial number of toilets.

Please share how the proposed solution meets stated Requirements and Acceptance Criteria :

This design proposes three measures to improve the usability and safety (both real & perceived) of toilet cubicles in refugee camps, especially for women and girls.

This design proposal addresses the stated Requirements as follows :

Be easy to retrofit, deploy and maintain.

Simple to maintain at low cost by people without specialist knowledge, to encourage sustainability – rather than replacing unit solutions.

The lock and the light (together with the emergency alarm system) can be easily fixed to the door frame / door leaf / ceiling of the toilet cubicle by screws. Installation by non-construction-trained people will do the job. Timber packing piece is required for secure fixing of the lock and the light to the door leaf and ceiling, especially to corrugated metal sheet door and ceiling.

The lock requires almost no maintenance except when the screws become loose after repeated use of the doors for a long period of time. New timber packing piece can be used to replace old one, and the lock can be re-screwed into the new timber packing piece.

As LED strip lighting is a durable light, it is expected that minimal maintenance is required throughout the lifespan of the light. In the event of loss of light intensity (of more than 30% of original light intensity) which makes the LED light 30% dimmer, the extensive length of the LED strip may compensate for the loss of light intensity. In the unlikely event of total failure of the LED strip lighting, a new LED strip lighting can be inserted into the PVC flexible hose.

In the event of change of color of the LED strip lighting (due to manufacturing defects), it will not affect the light intensity much. The LED strip lighting can also be replaced easily if necessary. Replacement rolls of LED strip lighting can be sourced easily from local or regional shops.

In conclusion, the lock, light and emergency alarm system are designed to require minimal maintenance, and in the event of malfunction, only certain component parts of the system need to be replaced instead of the whole unit being replaced.

Production at low cost: below $20 USD maximum per cubicle.

The cost estimation for the design is as follows:

Lock : $3 USD maximum
Including : stainless steel lever, parts, nuts, screws, plastic extrusion (casing & handle)
Excluding : timber packing piece

Light : $10 USD maximum
Including : plastic casing (O-shaped ring & circuit board casing), dimmable LED strip lighting, dimmer, circuit board, motion sensor, wiring, plastic cable tie, clear PVC flexible hose, stainless steel screws.
Excluding : timber packing piece, power source (solar panel)

Emergency Alarm System : $4 USD maximum
Including : circuit board, panic button, ring bell (alternative)
Excluding : power source (solar panel)

The combined production cost for all the items above will be kept below $20 USD maximum per cubicle.

Transportation cost for the above items in bulk to installation site is excluded. As the lock, light (which can be coiled to reduce its volume) and emergency alarm system are not bulky items, the transportation cost (in bulk) to installation site is estimated to be affordable.

Labor cost is also excluded from the cost estimation. As the lock and light (together with the emergency alarm system) can be easily installed by non-construction-

trained person, the labor cost is estimated to be affordable. However, worker with basic know-how of connecting the lights (together with the emergency alarm systems) through wiring to the power source (solar panel) will be required for this connection work.

As elaborated earlier, the lock, light and emergency alarm system are designed to require minimal maintenance. Replacement of faulty component parts can be carried out by sourcing for replacement parts locally and regionally. Hence, the maintenance cost is estimated to be affordable.

The lock, light and emergency alarm system can be easily retrofitted to existing latrines (many toilet cubicles) within a day. However, more time may be required to connect the light (together with the emergency alarm system) to the renewable power source (solar panel) depending on the availability of the solar panel system and manpower with electrical know-how.

Be easily replicated in other, global contexts.

The lock, light and emergency alarm system are “open design”, i.e. they can be easily replicated in other contexts with variations in component parts, as long as the main design principle is retained.

The lock is designed to have a long stainless steel lever to secure the door leaf, and to provide substantial leverage against the muscle power of the intruder. However, variations to the stainless steel lever and plastic extrusion casing & handle (of different sectional profiles) can be used to replace the original design of the lock, as long as they are able to secure the door from being forced open by the intruder. The main design principle of using a long lever to provide leverage against the muscle power of the intruder is to be retained.

The light is designed to have a substantial length so that it provides ample lighting to the toilet cubicle. The length of the light also allows it to be swung in all directions to create a swinging light effect as a signal calling for help during emergency. This

is the main design principle of the light that is to be retained.

Variations of component parts of the light are possible. For example, the clear PVC flexible hose can be replaced by similar flexible hoses of varied diameters. This “open design” provides flexibility in assembling the light from component parts that are readily available or cheaper in terms of production cost.

The same applies to the emergency alarm system which can also be assembled using similar component parts that are readily available or cheaper in terms of production cost.

This design proposal addresses the stated Acceptance Criteria as follows :

Locking - methods to lock and provide secure, tamper-proof cubicles that offer privacy and comfort :

- Easy to install and maintain, even for untrained persons.
- Flexible in terms of door type, material, and construction. However, timber packing piece may be required for corrugated metal sheet doors.
- Theft-resistant, as far as possible.
- Meets cost constraints.

Lighting - automatic and dimmable lighting, irremovable, and powered by renewable energy :

- Provide lighting for at least 12 hours.
- Low maintenance, even for untrained persons.
- Renewable and independent energy source.
- Theft-resistant, as far as possible.
- Robust, weatherproof, and waterproof.
- Flexible in terms of type of latrine / cubicle design. However, timber packing piece may be required for corrugated metal sheet ceilings.
- Meets cost constraints.
- Adjustable lighting levels.

(Other Innovative Improvement) Emergency Alarm System :

- Easy to install and maintain, even for untrained persons.
- Low maintenance, even for untrained persons.
- Renewable and independent energy source.
- Theft-resistant, as far as possible.
- Robust, weatherproof, and waterproof.
- Flexible in terms of type of latrine / cubicle design.
- Meets cost constraints.

How does the solution impact lighting, locking, alerting or other innovative improvement or integration propositions?

The proposed design solution offers a different genre of locking and lighting solution to the toilet cubicles in refugee camps. In other words, the lock and the light are not the common ones that one would expect to see and use. They are designed to offer a sense of security to the users, and in reality they are also designed to be sturdy and fit for purpose.

The proposed design solution also intends to inspire other designers to come out with design solutions that offer a sense of security to the users especially women and girls in refugee camps. It is thought that mere functional fit is not enough. A secure lock and an effective light must also offer a sense of security and reliability to the users.

What is the estimated cost for this solution?

The cost estimation for the design is as follows:

Lock : $3 USD maximum

Including : stainless steel lever, parts, nuts, screws, plastic extrusion (casing & handle)

Excluding : timber packing piece

Light : $10 USD maximum
Including : plastic casing (O-shaped ring & circuit board casing), dimmable LED strip lighting, dimmer, circuit board, motion sensor, wiring, plastic cable tie, clear PVC flexible hose, stainless steel screws.
Excluding : timber packing piece, power source (solar panel)

Emergency Alarm System : $4 USD maximum
Including : circuit board, panic button, ring bell (alternative)
Excluding : power source (solar panel)

The combined production cost for all the items above will be kept below $20 USD maximum per cubicle.

Transportation cost for the above items in bulk to installation site is excluded. As the lock, light (which can be coiled to reduce its volume) and emergency alarm system are not bulky items, the transportation cost (in bulk) to installation site is estimated to be affordable.

Labor cost is also excluded from the cost estimation. As the lock and light (together with the emergency alarm system) can be easily installed by non-construction-trained person, the labor cost is estimated to be affordable. However, worker with basic know-how of connecting the lights (together with the emergency alarm systems) through wiring to the power source (solar panel) will be required for this connection work.

As elaborated earlier, the lock, light and emergency alarm system are designed to require minimal maintenance. Replacement of faulty component parts can be carried out by sourcing for replacement parts locally and regionally. Hence, the maintenance cost is estimated to be affordable.

The lock, light and emergency alarm system can be easily retrofitted to existing latrines (many toilet cubicles) within a day. However, more time may be required to

connect the light (together with the emergency alarm system) to the renewable power source (solar panel) depending on the availability of the solar panel system and manpower with electrical know-how.

How can this be retrofitted to existing latrines? If it can't, please state your use case.

The lock, light and emergency alarm system are ready to be retrofitted to existing latrines. The lock can be screwed onto the door frame and door leaf easily, a timber packing piece will be necessary for secure fixing of lock to corrugated metal sheet door. The same applies to the light (together with the emergency alarm system).

As long as the existing latrines have solid enclosures (roof, wall, door), the lock and the light (together with the emergency alarm system) can be retrofitted to these latrines. However, if the existing latrines have no solid enclosures (for example, they are enclosed only by tarpaulin sheets supported by solid posts), the lock and light will not be able to be retrofitted to these latrines.

The lock, light and emergency alarm system can also be retrofitted to existing toilets at schools and health clinics.

How will this solution be maintained?

The lock requires almost no maintenance except when the screws become loose after repeated use of the doors for a long period of time. New timber packing piece can be used to replace old one, and the lock can be re-screwed into the new timber packing piece.

As LED strip lighting is a durable light, it is expected that minimal maintenance is required throughout the lifespan of the light. In the event of loss of light intensity (of more than 30% of original light intensity) which makes the LED light 30% dimmer, the extensive length of the LED strip may compensate for the loss of light intensity. In the unlikely event of total failure of the LED strip lighting, a new LED strip lighting can be inserted into the PVC flexible hose.

In the event of change of color of the LED strip lighting (due to manufacturing defects), it will not affect the light intensity much. The LED strip lighting can also be replaced easily if necessary. Replacement rolls of LED strip lighting can be sourced easily from local or regional shops.

Please share the innovative highlights of your proposed solution.

This design proposal is conceptualized with human mentality and intuition in mind. In other words, the design is created from the perspective of how people respond to emergency events intuitively.

For example, the lock is designed to be unusually large so that it offers the user a sense of safety and reliability. In the event of an emergency, one can just hold the handle of the lever, press it down to secure the door from being forced opened by intruder. The long lever of the lock offers a leverage against the muscle power of the intruder. It is strong in reality and in perception.

The light is designed to be unusually long. The extensive length has many uses. It brightens up the toilet cubicle, compensates for loss of light intensity, and can be swung in all directions as a visual signal calling for help. It is integrated with an emergency alarm system which gives off alarm sound when it is activated by pressing a panic button.

Size does matter in this design proposal. The unusually large sizes of the lock and the light in a way makes it rather hard to be stolen, as it would be hard to keep them hidden when one intends to steal them. When the lock and the light were stolen and be used in other places, their large size and unique look will make them highly noticeable to others. This will help to reduce the likelihood of them being stolen and used in other places, as people can easily spot these theft items and report it to the refugee camp management for the common good.