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Innovation Plan EIP  
DECA TCS  
Trinity College School

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SpudLight™

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## *SHINE-ing a new light on Bangladeshi communities.*

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SpudLight Inc. presents SpudLight™ - our solution for those in Bangladesh who cannot afford electricity and are dependent on sources of short term light. Our mission statement is to “strive to be able to provide a cheap, environmentally friendly source of light, for rural communities in Bangladesh. We aim to provide our product at an affordable price, while at the same time helping the communities in the nation.”

Our slogan encapsulates the benefits and critical focus the company has used to drive the product.

**Satisfy** We aim to satisfy the needs of the low-socioeconomic status consumer base of Bangladesh, more specifically in rural communities in which access to electricity is unavailable. We also want to provide a safer alternative to kerosene, alleviating issues highlighted in the problems portion of the report.

**Health and Safety** The health and safety of the consumer base was the forefront of our design process, and our product ensures a safe, easy to use and cleaner alternative to kerosene lamps.

**Innovative** We set out to distinguish ourselves from the currently existing competition, and our design reflects this. Taking advantage of readily available goods to produce light past the night time proves to be extremely beneficial for those in the household.

**Natural** Harnessing the power available in potatoes rather than kerosene results in a more sustainable, environmentally friendly product and yet again keeps the health of the consumer in mind.

**Economy** Our product helps foster the Bangladeshi economy by utilizing more potatoes - assisting the agricultural industry. Furthermore, all production is set to occur within the nation to provide economic opportunities to locals, and our product allows members of the household to work past hours to earn extra income.

SpudLight™ addresses the numerous issues with kerosene lamps. The inhabitants of Bangladesh are part of the 1.6 billion people using kerosene lamps across the world today. However, kerosene lamps inhibit both the physical and financial aspects of Bangladeshis' lives.

## Functional Issues

Although being the best choice of oil lamp, kerosene lamps are incredibly inconvenient to use. The wick must soak up to one hour after pouring the oil, and the flame requires time to build. Afterwards, further actions need to be done to ensure safety, such as cleaning the lamp and location choice. Another disadvantageous aspect of a kerosene lamp is the lack of adequate lighting - requiring close proximity to the lamp, fostering a greater risk of burns and increased toxic fume inhalation. A marketing assessment report done by the International Finance Corporation found that out of 200 households, 40% reported moderately sufficient or insufficient lighting.

Figure 1 shows the predicted number of work hour increase following the implementation of an electronic light source. The data shows virtually all of the participants reporting a likely increase in work hours. This increase has the potential to expand one's monthly income by over 15%.

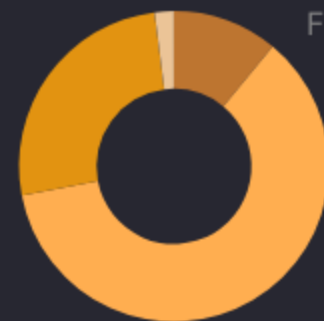


Figure 1:

1 hour (11%) 2 hours (61%) >2 hours (26%)  
No Increase (2%)

## Physical Consequences

Kerosene has immense physical impacts on one's body through burns and direct consumption. In developed countries, household burns may seem inconsequential; however, in Bangladesh, burns are a significant cause of morbidity and disability. Burns are the third leading cause of illness for toddlers in Bangladesh. The Institute of Child and Mother Health completed a study which found kerosene lamps as the primary cause of burns for children aged 1 to 15.

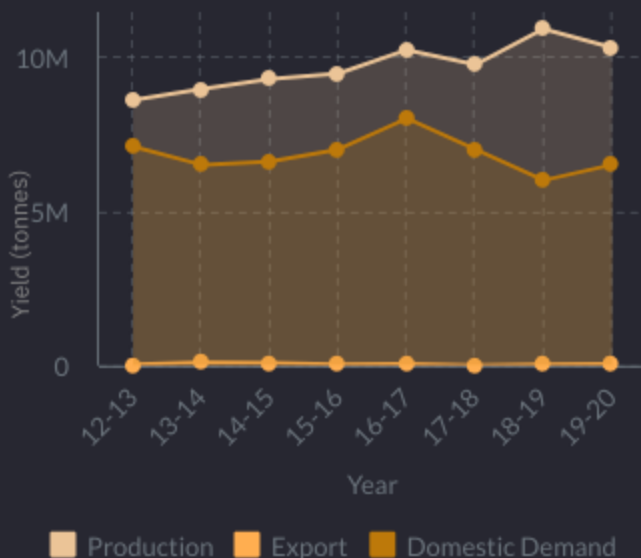
Most households are also uninformed of the most basic burn treatments, possibly resulting in children missing school or being unable to help run the household. Treating the burn at home can also take time out of earning income for the rest of the family. Another study performed in the Centre for Injury Prevention and Research Bangladesh (CIPRB) found that the average treatment cost for a severe burn is upwards of \$450 and statistically 61% of households earn under \$50 a month. Burns have detrimental effects not only physically and emotionally, but economically. Furthermore, kerosene is often mistaken for water by children due to its similar appearance and storage. A study conducted in the Dhaka Medical College Hospital published an analysis of 56 kerosene consumption cases and found that 71% of these cases were caused by kerosene oil containers that resembled a soft drink bottle. The careless packaging of kerosene has taken a toll on hundreds of Bangladeshi's lives.

## Economical Situation

Economically, SpudLight™ helps ease the issue of the overproduction of potatoes.

Potatoes are often mass-produced as they are extremely versatile in terms of where they can grow and how they can be processed.

Figure 2: Bangladesh Potato Stats



Bangladesh, being an agricultural country, produces a large number of potatoes, as seen in Figure 2. It's clear that their exports are almost negligible, this is due to Bangladesh's lack of facilities to test for diseased crops. The consumption of potatoes is also not reaching production levels, causing an annual surplus of about 2.5M - incurring a tremendous loss for farmers, especially due to the lack of storage facilities.

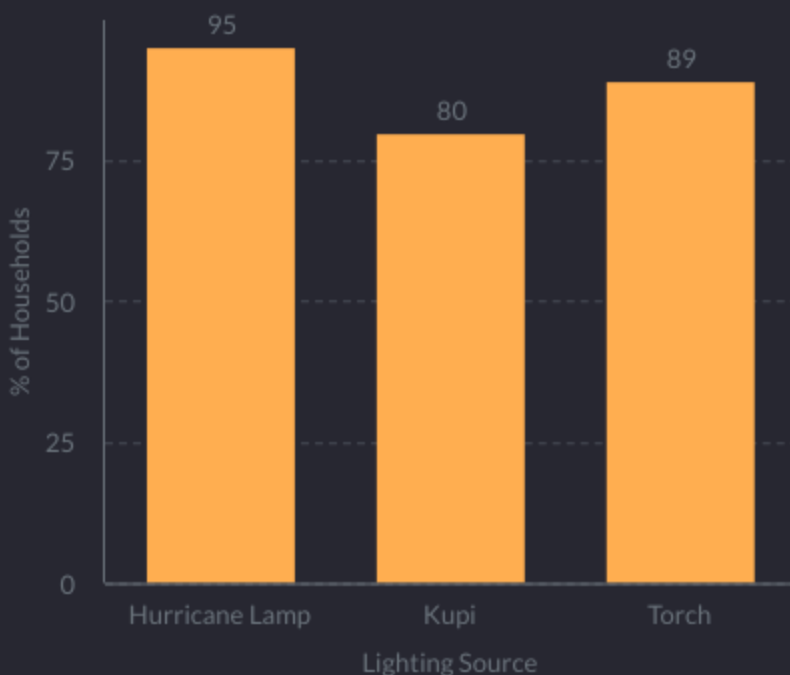


SpudLight™ is primarily focused on consumers that are low in socioeconomic status, with our starting focus being for those situated in Bangladesh. Although Bangladesh has seen a fivefold increase in the availability of electricity, there is a divide in its distribution between the rich and impoverished. In light of this, our product is aimed towards those in more rural areas in which electricity is not available for most.

According to the International Food Policy Research Institution (IFPRI), as low as 37.1% of the nation's poorest households receive electricity. A lack of electricity can be detrimental to the people of Bangladesh in many ways than one. The aspect we focus on is the inability of the people to be able to participate in income-generating activities at home. Not only can the working hours of a household be lengthened by providing good lighting, but it also allows women to perform activities that generate income in their free time.

SpudLight™'s customer market has been tailored towards rural Bangladesh communities, which have a strong need for the product, as highlighted in the problems section of this report. In addition, Figure C shows the level of dissatisfaction with kerosene powered lighting sources.

Figure 3:  
Dissatisfaction With Current Lighting



SpudLight™ provides an environmentally friendly, cheaper, safer, and more sustainable way to light impoverished homes in rural Bangladesh. Our attention to the target audience and research has resulted in an innovative and unique design that is of the first of its kind available for the market.



## *Design and Functionality*

The foundation of SpudLight™ is its ability to use a potato to power the LED lamp, and achieving this is simple and cost-effective. Two electrodes: one made of copper, and the other made of zinc, are held in a battery casing at the bottom of the lamp. A potato slice can then be inserted into the two electrodes, and the LED can be lit up. What gives the potato this ability is its high phosphoric acid content, which reacts with each of the electrodes: the copper electrode undergoes a reduction reaction; which is a reaction in which electrons are gained, whereas the zinc one undergoes an oxidation one; in which electrons are lost. This results in an electron imbalance (voltage) to be created, and the potato itself acts as what is called a “salt bridge” to complete the circuit. The electron flow from the zinc electrode to the copper one through the wire is what allows the utilization of this current to power the lamp. Boiling the potato allows the dense tissue in the potato to be broken down, reducing the resistance of the electrical flow through the potato and therefore increasing the voltage significantly.





## *Unique Value in the Market*

SpudLight™ is an innovative product that has never been on the market, despite the technology existing.

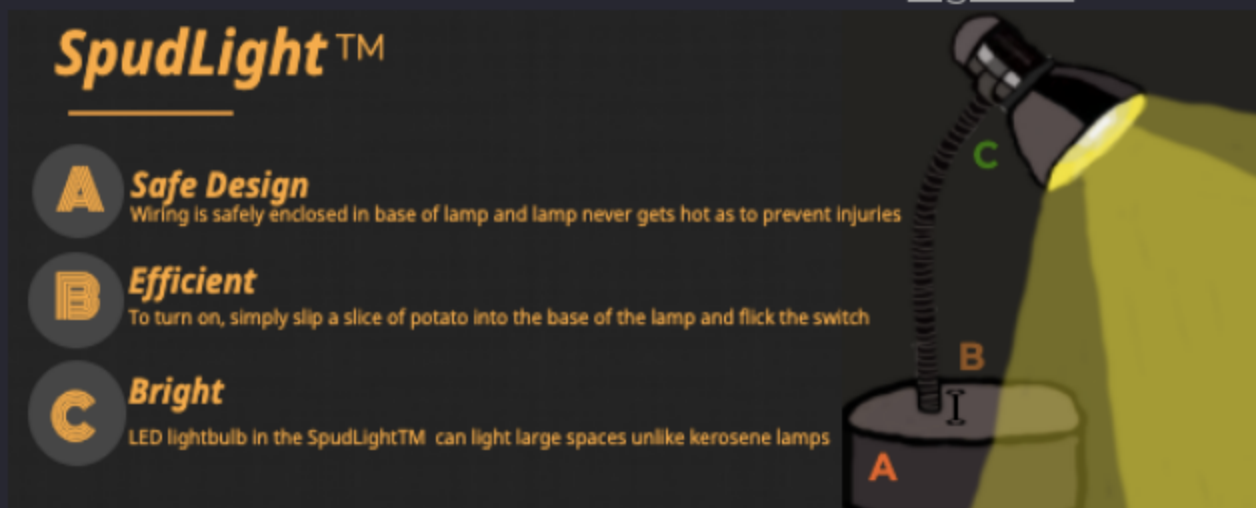
There are reasons for this involving supply and demand, as well as the existence of similar products. However, SpudLight™ takes a unique approach to lighting, taking numerous problems into consideration that our competitors have not addressed. Multiple companies have distributed solar lights throughout Bangladesh to limit the use of kerosene lamps. SpudLight™, on the other hand, was a product inspired by the large amounts of food waste, specifically potatoes, in the world. Potatoes are the 3rd most wasted food, and approximately 5.8 million potatoes per year are discarded globally. This was shocking considering how versatile potatoes are with dozens of products stemming from these vegetables. However, they are also easy to grow as they can last in a variety of weather conditions, as such they are often overproduced. SpudLight™'s innovative concept involves purchasing local Bangladesh potatoes to reduce the loss farmers face due to unsold potatoes. Bangladesh is an agricultural-based country, and farmers are not only a fundamental part of Bangladesh's economy, but also a large part of the community population-wise.

Furthermore, the customer market has been tailored towards a community, rural Bangladesh, that has a strong need for a product, as highlighted in the problems portion of this report. Obviously, the presence of kerosene lamps in the home brings extreme risk to the inhabitants. Overall, SpudLight™'s specific consumer base and product development create an extremely useful product that has the capabilities to impact entire communities positively.



Kerosene lamps can cause harmful burns for children as well as produce toxic fumes that affect those in the home. The unique design of SpudLight™ limits harm to humans, and does not contribute to air pollution.

Figure 4



## Electricity

SpudLight™ runs on electricity which means no open flame or any fumes is being emitted. This means that the toxic fumes that kerosene lamps produce (which can cause health problems such as lung disease) will no longer plague the households of Bangladesh. SpudLight™ was created as a safer alternative for households and consequently, poses limited threats to children who, if the lamps were designed differently, may injure themselves (Figure 1).

## Efficiency

Efficiency is one of the most alluring factors of SpudLight™. Saving the consumer time is crucial - and in this regard, SpudLight™ once again makes kerosene lamps obsolete. As opposed to kerosene lamps which have a long set up time, with SpudLight™ all you need to do is insert a potato slice and place it in the lamp (Figure 1).



Another fact that highlights the superiority of our product is how the light produced is considerably more substantial than that of a kerosene lamp. It is evident that SpudLight™ has been designed to fit into the Bangladeshi lifestyle with ease, creating a highly desirable product for the population.

## *Economically*

One of Bangladesh's most-produced vegetables (potatoes) is incurring huge losses for farmers. However, the creation and daily use of SpudLight™ in Bangladesh will help fill the gap between the supply and demand of potatoes, leading to increased profits for local farmers.

## **CONCLUSION** /

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Overall, SpudLight™ provides households with effective, efficient, and inexpensive lighting using the electrochemical properties of the potato.

In more developed countries, SpudLight™ would most likely cause further inconvenience for consumers compared to lamps that are already in use. They also have the resources to ensure exported foods such as potatoes are safe, unlike developing countries like Bangladesh, which have numerous economic barriers in exporting goods. However, the originative design of SpudLight™ provides unique benefits to both the Bangladeshi users and producers of this product. Realistically, SpudLight™ is not meant to change the entire world or even an entire country. This product was merely made to help make Bangladeshi farmers' and inhabitants' lives easier and safer. SpudLight™ focuses on issues in developing countries that are often overlooked. Currently, the expectations for SpudLight™ are small scale; however, this product has the capabilities to make a difference in hundreds of lives.



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