

Stanford University Social Entrepreneurship Startup

China Business Plan and Recommendations

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Table of Contents

1	EXECUTIVE SUMMARY	3
2	THE BUSINESS AND ITS PRODUCTS	6
3	THE CUSTOMER	9
4	THE ECONOMICS OF THE BUSINESS	15
5	PRODUCT AND TECHNICAL DETAILS	28
6	DISTRIBUTION PLAN	32
7	MARKETING PLAN	35
8	MANUFACTURING PLAN	37
9	ORGANIZATION	38
10	OVERALL SCHEDULE	41
11	PARTNERS AND KEY RELATIONSHIPS	42
12	CRITICAL RISKS AND ASSUMPTIONS	44
13	PILOT PROJECT RECOMMENDATIONS	45
14	APPENDICES	48

1 Executive Summary

1.1 Description of the Business Concept and the Business

LUTW China is a for-profit organization that will provide electric powered lighting systems to underserved market segments in China. Its primary purpose will be sales and marketing in 6 provinces in China, leveraging a mobile salesforce to establish a network of third party retailers. LUTW Global will provide the product design and manufacturing expertise.

The lighting system will consist of an LED lamp unit, batteries and a solar panel charging system and will retail to the end customer for 175 Yuan (\$22). The end user will initially be night market vendors, who will use the light to display their products for sale. The value proposition is that this light will be cheaper than their kerosene and petroleum alternatives, and through solar recharging will provide almost zero variable costs and hence allow them to extend the daily usage of their light.

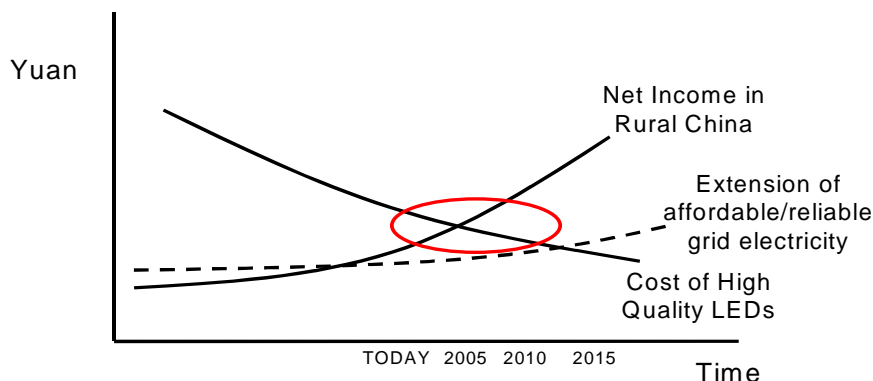
Our ultimate goal is to reach the homes of the rural poor in China, so that they can enjoy the health, cost and convenience advantages of solar powered lighting. The night market vendors provide a perfect seed population to enable us to grow into the domestic rural market – the markets are highly visible to a large cross section of the population, and the concentration of entrepreneurs will ensure that as soon as demand for our product grows, market forces will ensure that it is met.

There are a few key assumptions that still need to be validated before this business is launched and we recommend a pilot project to test these as the next phase. The key unknowns are really testing the price point and our ability to establish a retail network in these areas.

1.2 The Opportunity and Strategy

Hundreds of millions of rural Chinese either do not have electricity at all and use fuel-based lighting systems or only have access to electricity that is prohibitively expensive and/or unreliable. We estimate that 400 million rural Chinese have inadequate or expensive light and 150 million more live off-grid (77 million relying on batteries and diesel generators and 73 million on fuel-based systems only)¹. For “fuel”, many rural Chinese use gas, kerosene, candles, and biomass lanterns for light—all which have negative health consequences and do not provide sufficient light for many activities such as reading or intricate handwork. Therefore, there is a huge opportunity to meet this need with a low-cost, high quality light that enables the end user to lower the operating cost associated with lighting and increase consumption of high quality, clean light.

This project seeks to capitalize on the convergence of two trends: increasing per capita income in rural china and decreasing cost/increasing efficacy of LED technology. We believe that LUTW is in a unique



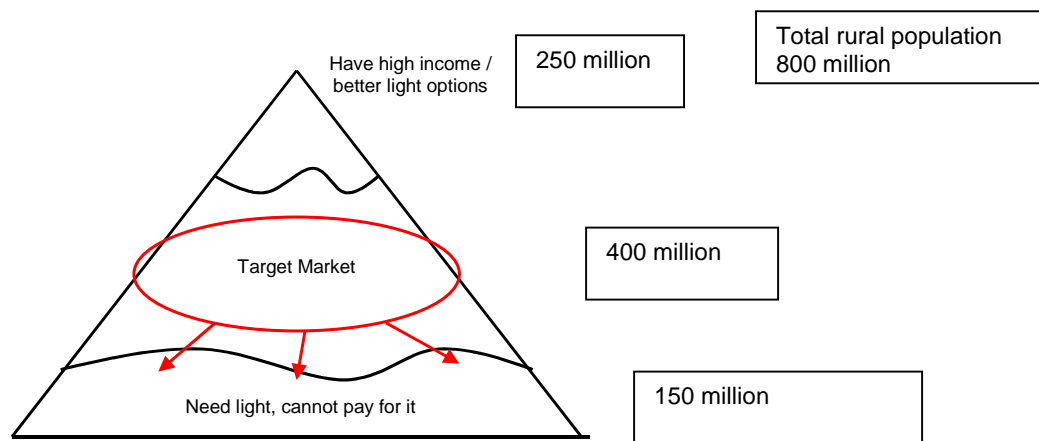
position to capitalize on the convergence of these trends over the next 15 years and beyond. Specifically, we believe LUTW should enter the market over the next year with an initial product and continue to

release newer, lower cost versions of the light as LEDs fall in price. In this manner, LUTW will be able to reach lower net income households over time.

1.3 The Target Market and Projections

There is no doubt that China has been experiencing unprecedented economic growth since the liberalization of its markets in the past twenty years. Over 90% of the country has access to the electricity grid, and 90% of this electrified group have color TVs in their homes. In a country seemingly so well provided for, where is the need for a product such as an LED light with a renewable power source? To answer that question, we need to take into account all aspects of the Chinese economy. At the same time that the overall living conditions for some have been improving, other segments of China's population are lagging in the wake of economic boom. Until fairly recently, rural and western China has been consistently overlooked by governmental development efforts and foreign investors due to its relative inaccessibility and harsh conditions. As a result, this is the area of the country where food is scarcest and infrastructure is at its worst. The disparity that exists between the urban affluent and the rural poor continues to grow. Our project aims to alleviate some of that disparity by providing a source of lighting for rural regions of China as the impetus for a better life.

The social goal of this project is to get light to those who need it most in a sustainable way. Through our research and business analysis, however, we believe that directly targeting the poorest populations that have the greatest need for any light is not sustainable. Therefore, we advocate a model that can target both consumers without a decent source of light as well as slightly more affluent consumers whose light needs are still unmet but has higher consumption demands for light and higher income to purchase light. In this manner, LUTW China can establish a presence, drive down manufacturing, sourcing and distribution costs, and continually extend out to lower and lower income consumers.



1.4 The Competitive Advantages

The long-term competitive advantages of the LUTW light are nearly zero operating costs and longevity. Both of these advantages stem from its low power consumption. With a LUTW light, consumers can double their current light consumption while incurring only \$1.20 in operating costs per year. The only operating cost of significance is the purchase of rechargeable batteries (\$0.60 each) once a year. Compared to competitive products such as candles, kerosene, and flashlights that have constant recurring costs associated with their use, this will be a huge competitive advantage.

In addition, the LUTW light will be portable, durable, and emit more lumens than many competitive products that exist in the market.

1.5 The Economics Model

The product will sell for \$22. Of that \$2.20 (10%) is retail margin, \$13 is product costs and \$2.20 is transportation costs leaving \$4.60 contribution as to LUTW China. This \$4.60 has to then cover all of the LUTW China overheads and labor costs.

When this business reaches steady state (2 years after launch), when a retail network is established in 6 provinces, LUTW China will sell approximately 60,000 units per year on revenues of \$1.22m. We estimate that LUTW China would have a net loss of approximately \$50,000 per year.

Validating the key assumptions behind these figures would be the main goal of the pilot project. If we discover that some of our assumptions are just a little conservative, then this business would be profitable and self-sustaining.

1.6 The Next Six Months

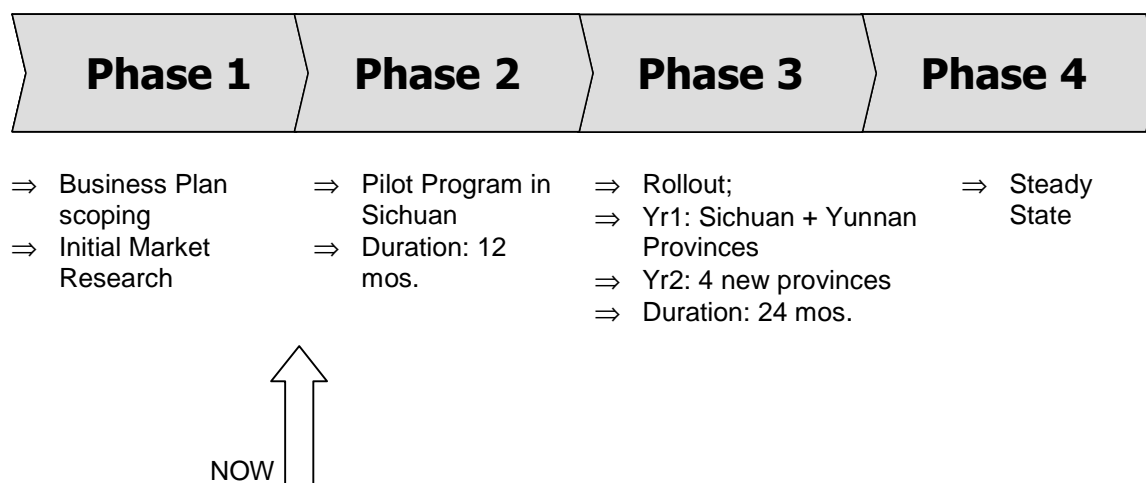
In order for LUTW to be successful in China, it should spend the next six months establishing a pilot project in Sichuan Province. This will involve hiring a country director for China, who must reside in China and manage the pilot on a daily basis. Everything in the business model should also be tested, which will mean hiring of marketing agents that will promote the light and establish relationships with local retailers. The objective of the pilot project is to test the key assumptions (and therefore recommendations) made in this business plan:

- The product can be manufactured for \$13
- The price of the light at 175 Yuan is acceptable for our target market
- Night vendors are able to make long term trade-offs, including a higher upfront cost for longer-term savings
- The design of the light meets user needs
- Marketing agents will be able to drive sales by establishing relationships with retailers
- Reliability of the product is over 95% in first year
- The operational structure of LUTW China is able to manage transportation, accounting and logistics.

This includes testing assumptions about primary and secondary target markets, consumer needs, and the best way to structure distribution, employee, and retailer relationships.

1.7 The Rollout Strategy

The initial 4-year strategy will be a four-phase process:



2 The Business and its Products

2.1 The industry – existing alternatives and competition

The “industry” of lighting in rural China is highly fragmented and varies depending on geography, economics, and culture.

2.1.1 Power

The grid: The grid has extended across much of China, but is still expensive, highly unreliable, or non-existent in many parts of rural China. As shown in the chart in section 1.3, a significant percentage of rural provinces remain without electricity.

In addition, many rural governments charge a surcharge, making electricity unaffordable for many rural households.ⁱⁱ

Hydropower: Some rural areas have witnessed an increase in hydropower generated electricity. Two of the main problems associated with this have been: (1) very expensive form of energy, (2) seasonality of availability— in particular at the end of the winter dry season.

2.1.2 Lighting

Kerosene/Petroleum/Gas: We have found that Kerosene is less prevalent in China as it is in many other developing countries. The most typical use of kerosene is in a low quality lantern or a small amount poured into a can and lit. In addition, many night market vendors use pressurized pumps, in which air is mixed with gas/petroleum and a small flame emerges at the top of the device.

Biomass and Firewood: In many rural, low-income areas of China, “gatherable” products serve as sources of lighting. Specifically, rural Chinese will burn the following in lanterns or stoves to produce light:

- wood or agricultural residues, such as straw (typically burnt in stoves)
- converted yak by-products, such as refuse and milk in the form of butter (typically burnt in lanterns)

By some accounts, firewood and agricultural residues account for 80% of rural household energy use.

Incandescent and Compact Fluorescent Bulbs: Incandescent and CFLs are highly used in areas that have access to the grid. Both types of lightbulbs are inexpensive but highly unreliable. In fact, consumers often purchase multiple lights at a time with the understanding that some proportion of bulbs will break or not work for long.

THE LIGHTING INDUSTRY IN RURAL CHINA

Current sources/costs of Light:

Units	1999	1997	1995	1990
Coal (10,000 tons)	8408	8884	13530	16700
Kerosene (10,000 tons)	71	63	64	105
Liquefied Petroleum Gas (10,000 tons)	878	769	534	159
Natural Gas (100 mill cu.m)	26	24	19	19
Heat (10 bill Kj)	20127	18711	16432	8972
Electricity (100 m kwh)	1481	1325	1253	481
Biomass	No estimate	No estimate	No estimate	No estimate
Flashlights	No estimate	No estimate	No estimate	No estimate

2.1.3 Batteries, Charging Devices

Batteries: Disposable alkaline batteries are the most prevalent batteries in Rural China.

Solar: Solar has met some success in China and there are numerous programs focused on bringing solar chargers to rural areas. LUTW China sees existing solar panels as a complement to our business as users can plug the LUTW light into existing solar systems.

2.1.4 Key Trends

This project seeks to capitalize on the convergence of two trends: increasing per capita income in rural china and decreasing cost/increasing efficacy of LED technology. We believe that LUTW is in a unique position to capitalize on the convergence of these trends over the next 15 years and beyond. Specifically, we believe LUTW should enter the market over the next year with an initial product and continue to release newer, lower cost versions of the light as LEDs fall in price. In this manner, LUTW will be able to reach lower net income households over time.

Table: Per Capita Annual Net Income of Rural Households (in Yuan)

	2001	2000	1999	1998	1997	1996	1995	1990	1980
Yuan	2366.4	2253.4	2210.3	2162.0	2090.1	1926.1	1577.7	686.3	191.3
CAGR	5.0%	1.9%	2.2%	3.4%	8.5%	22.1%	18.1%	13.6%	

The above table, however, only tells the story of the “average” rural household. Looking more specifically at how different types of households have faired, those still relying on subsistence farming continue to generate very low household income and have not vastly improved their standard of living. In comparison, those rural Chinese who are able to gain work or income from the larger cities or have a specific skill they bring to market (again in larger villages/cities) have dramatically increased their income and standard of living.

2.2 *The Organization and the Concept*

LUTW China will be organized to serve the needs of our primary customers: (1) users of the light, and (2) retailers of the light. As both of these customers reside in local markets, LUTW China will be organized around these local markets, with the majority of staff and offices living and working there as well. Specifically, LUTW will employ marketing agents who will travel to villages, establish distribution relationships with retailers, and conduct demonstrations and other local marketing activities in order to promote the light to potential end users. Marketing agents will handle the physical distribution of the lights from the LUTW provincial headquarters to their partner retailers. The provincial offices of LUTW will serve a couple main functions: (1) handle all finances, credit-relationships and accounting, (2) aggregate feedback that is received directly from the field, (3) communicate inventory needs to LUTW headquarters and ensure that retailers have adequate stocks of lights to sell. LUTW China must be highly entrepreneurial, with most staff and all retail partners operating on partial or full commissions.

(Section 9 covers the organizational model in more detail).

2.3 The Product

Our field research has shown that our target market needs a solution that:

- can provide both ambient and task lighting
- lights food and clothing in a positive manner (i.e. does not make tomatoes look blue)
- is highly durable and lasts a long time
- portable
- and it low cost (especially in comparison to other substitute products).

Therefore, LUTW China's initial light product will be an LED light that is designed to provide both task (i.e. lights an area 3 ft x 3 ft) and ambient light (lights a 10x10 room well enough to see people's faces). We believe LEDs are the most compelling source of light (versus CFLs, incandescents, etc) for multiple reasons. Some of these reasons include cost, durability, and longevity, but we will go into technical details fully in a subsequent section. Importantly, LUTW China's product, is philosophically technology agnostic in that the organization would move away from LEDs if another form of lighting proves superior in terms of cost, lifespan, durability, or other important attributes.

Table: Product Specifications for LUTW China light

Light Source	LED- Luxeon
Battery	2-non removable, rechargeable batteries (4.5 hour life after 7 hour charge)
Optics	Adjustable task/ambient light
Power Source	Integrated solar panel
Optional Power Source	Adapter to plug into existing solar system or electrical grid
Light type	Ambient and task
Cost	175 Yuan, or \$22.00

3 The Customer

3.1 Potential Target Markets

Beyond the location of our launch, it is important to identify which specific segment of the market we want to target. Within Sichuan Province, there are several distinct markets:

- **Nomads**
They herd yak, goat, and sheep throughout western China. Some nomads are sedentary during the winter when grazing for the livestock is not plentiful. They have no access to electricity while moving. While nomads are not wealthy, they are able to access lump sum amounts of cash from yak sales in town in order to purchase the light. This is not an ideal market to initialize a project because of the low population density. It is, however, a great place to start with the second phase of our plan to sell LED lighting where the volume we sell will no longer be dependent on these nomads.
- **Women Entrepreneurs**
These are women who either work in the cottage industry to manufacture consumer goods for larger retail chains for export or have their own business. We think that our light will be able to increase their productivity and result in a higher income for them. However, our price point is still too high of this segment. They will also be a good secondary market when we can bring down the price of the product.
- **Tibetan Monasteries**
Many children are sent to monasteries by their parents as the only chance to get a Tibetan education and to get out of China. Students study by yak butter lamps in cavernous rooms day and night. There is no money in these monasteries for infrastructure upgrade without governmental subsidies.

Summary of Customer Segments

Segment Criteria	Yak Herders (Nomads) in Western China	Women Entrepreneurs in all 6 Provinces	Tibetan Monasteries	Night Market Vendors in Sichuan
Market Size (people)	~1,200,000	~6,274,000	~34,000	~900,000
Ability to Pay	V Low	Low	Low	Medium
Ease of Distribution	V Low	High	Low / Medium	High
Alignment w/ Mission	High	High	High	Medium
Customer Need	High	High (make more money)	Med (better light for reading)	Med (cost of light)
LED advantage over competition	High (provides electricity)	Med (unreliable electricity or candles)	High (candles)	Medium (flashlights or kerosene)
OVERALL ATTRACTIVENESS	LOW / MEDIUM	MEDIUM	LOW	MEDIUM

3.2 *Initial Target Market*

The most feasible initial customer segment is the **night market vendors**, with women entrepreneurs an attractive secondary market. Night market vendors are attractive not only because the light will provide immediate value to them but also because they are the best way to reach other market segments, such as women entrepreneurs and nomads that are highly aligned with LUTW's mission.

For night market vendors,

- The market will be ~900,000 people. This is a sizeable amount of people for us to target that will allow us to sell enough of the product to provide us with sustainability
- They have access to cash or credit to purchase the light
- The light will immediately benefit them either by increasing sales or decreasing costs, i.e. the light will attract new customers to their stand or saves them on the fuel they would otherwise have to continuously replenish for the kerosene or petroleum gas lamp
- The high visibility of this market segment to other potential customers such as women entrepreneurs and nomads who come to town to buy goods will also provide visibility to our lamp.

General Facts:

- Those who use kerosene buy them in liters from the filling station monthly or as needed basis
- Coal and natural gas are the most common fuel at the market
- They want to use the light for making clothes. They are most interested in light that provides sufficient and efficient light at night without interruptions. Their main concern is the brightness of the light rather than the size
- Greater percentage of vendors live close to the markets. In most cases the night markets provide the bulk of the family income. Depending on the situation, both men and women operate night markets, but most market vendors are women
- Most of the traders can read and write. Most of the traders' children get education in public schools and no child is seen loitering around during school hours
- Some traders come from different places to set up at night markets, but most are local. Most markets start as early as 5:30am until 10:30pm.

The User Experience (Appendix 1) shows in great detail how we expect the light to be purchased, used and maintained and how it will affect the lives of its customers.

Key Needs:

- More efficient light that saves money on purchasing fuel for kerosene or petroleum gas lamps
- More convenient light for multiple purposes for both the market and at home.
- Source of reliable light that is not dependent on the grid so he has more control over own living situation

3.3 *Target Geographic Markets*

Based on this need, there are six western provinces that we have identified as being possible launch sites for the project: Gansu, Shaanxi, Sichuan, Qinghai, Tibet, and Yunnan. (see Map of China in Appendix 4).

In general, the climate is suitable for solar panels (adequate sunlight) for most places. In provinces where monsoons are prevalent, variation of climate in other parts of the same province still provides a viable location (e.g. Sichuan is monsoonal in the east, but dry in the west). In terms of size of the market, Sichuan has the highest number of rural residents, while Shaanxi has the highest number of rural entrepreneurs. Of the six provinces, Gansu residents consume the least and the Sichuanese the most. The household consumption for all six provinces, however, are below the average of \$197.86. From the

chart below, we see that the Tibet Autonomous Region has the greatest need for electricity and Sichuan province the least.

Summary of Target Provinces (Ordered by attractiveness and therefore suggested entry priority)

Province	Climate ⁱⁱⁱ	# of Rural Residents (in millions) ^{iv}	# of Self-Employed Individuals in Rural Areas ^v (eg, rural businesses)	Annual Household Consumption in Dollars (1USD=8.27 Yuan) ^{vi}	% Total without electricity ^{vii}	Regional Industry ^{viii}
Sichuan	East, monsoonal, humid, frequent fog West, highland, temperate, intense sunlight	61.80	998,000	210.83	2.6	Machinery, metallurgy, chemicals, building materials
Yunnan	Temperate, subtropical, tropical depending on season	32.86	501,000	<178.60	8.9	Tourism, tobacco
Shaanxi	Monsoonal North, temperate, semi-arid South, subtropical, humid	24.42	1,250,000	143.29	2.9	Coal and natural gas reserves
Gansu	East, subtropical/humid West, dry Considerable temperature shift throughout day and seasons	19.47	247,000	120.58	7.8	Herbal medicine
Tibet	Dry, cold, much sunlight, intense solar radiation	2.12	22,000	138.22	52.8	Animal husbandry
Qinghai	Dry, cold, strong and long hours of sunlight, drastic temperature change	3.38	530,000	<180.02	8.0	Herding, Salt factories, wool

From this information, we think that western **Sichuan** is the best province to initiate the project for several reasons:

1) Population density

More people will be exposed to our product and thus provide a means to quickly build the business with a firm customer base.

2) Best price match

Before we are able to lower prices of LED lighting even further, we have to be realistic about who will be able to afford our product initially. Sichuan province has the highest household consumption amount and therefore it may be more feasible for them to part with a large amount of money for an investment. After seizing this initial market, with the increased volume of manufacturing and the advancement of

technology, we hope to be able to lower the price of the LED light and target it towards poorer segments of the socioeconomic pyramid.

3) High number of potential retailers/customers

There are many self-employed people in this province who are potential retailers of our light or who will use our light to operate their own businesses. This will also help to market our product to the lower income segments of the community.

4) Climate

Western Sichuan is subject to intense solar radiation without extremes of temperature. These are ideal conditions for the use of solar panels.

3.4 Customer Financing

We are assuming that the annual household income for rural entrepreneurs is \$210.83. The light will cost them \$22.00, which will be 9.5% of their annual consumption. This will be a significant purchase for even for this segment of the population. Whilst our goal is that most of our customers will purchase the lamp outright, some may look to financing to help the purchase.

This gives an idea as to how money is spent in our target region and markets:

- Bicycles and TVs are common commodities in all cities and most villages.
- Cost of electricity p/h -- \$0.08
- The price of the batteries usually depends on the quality. But average AA batteries will cost \$0.25 (four in a pack). The D batteries also cost \$0.40 on the average (for two).
- Wholesalers usually come to the markets with their vans to off-load the goods. The majority of them rely on suppliers credit to keep their business running.

Our organization will not be responsible for providing an end user customer or retailer with credit to buy the light. If the Pilot Program discovers that financing is a hurdle to success, then LUTW China could work with one of the following organizations that already provide microfinancing in rural China:

- **Funding the Poor Cooperative (FPC)**
- **Association for Rural Development for Poor Areas in Sichuan (ARDPAS)**, a microcredit program that offers loans and skills training to families in rural Sichuan province, southwestern China.
 - ARDPAS currently reaches 50,000 clients, 43,000 of whom are among the bottom 50% of those living below the poverty line in China.
 - Sixty percent of ARDPAS's clients are women.

3.5 Market Size and Trends

3.5.1 Market Size

Looking at the night market trader segment as our initial target, the market size is about 998,000 people. If we are able to use the same distribution system for additional target markets and bring the cost of the light down to under \$5, we could reach a larger market that would include rural women entrepreneurs and nomads. This would expand the market to a total of 8.4 million people.

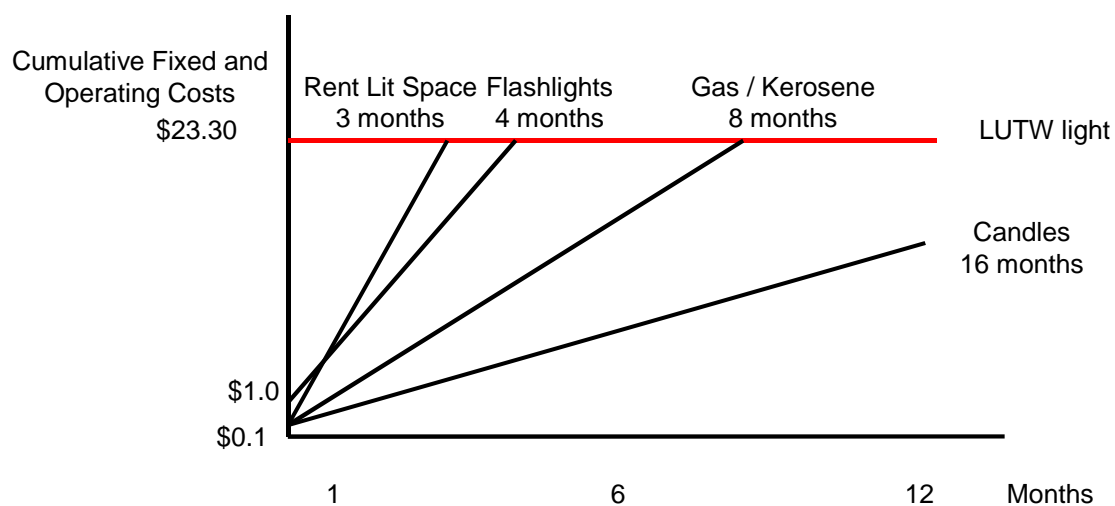
3.5.2 Trends

- There is heavy migration from the rural areas to the urban regions. There is potential that our light will eventually reach this market as well, especially suburban and peri-urban areas with highly unreliable light.
- Often times, young, able-bodied men migrate to cities without their families. Women are usually in charge in villages. Keeping this in mind while thinking about the marketing plan could be helpful.
- Unemployment is still a problem in rural China. In some areas, the unemployment rate is around 70%. As a result, entrepreneurship is increasingly becoming the most popular way of getting rich. The latest statistics from the National Bureau of Statistics (NBS) indicate that, Chinese farmers are getting increasingly better-off through the operation of small- and medium-sized business in rural areas, rather than from agriculture. These business operations include venturing into the marketplace to sell surplus crops grown or other consumer goods, such as hair accessories and clothing. ([China Daily](#) October 12, 2002)
- Shopping habits have changed considerable over the years with people buying more durable items than before. Shopping habits are likely to favor imported commodities in the years ahead.^{ix}

3.6 Competition and Competitive Edges

The market for lighting in rural china is moderately competitive. We have identified 4 main sources of light currently in use in our target market: night vendors in rural China. All products compete on cost, flexibility, and availability. For example, in very rural, very poor areas of China (that we are not initially targeting), the only lighting in use are candles or open cans of natural gas or kerosene, and less than \$1 per month is spent on lighting fuel. In order to be competitive in these markets, LUTW would have to provide a full solution, including solar panel or other means of recharging, for under \$10. In the night vendor market, however, the LUTW light (at a \$30 retail price) will be competitive with current lighting solutions, including petroleum/kerosene, flashlights, and rented lit spaces. This market segment is comparatively more affluent and spends significant amounts of money on the operating costs of their current light consumption.

Months to payback cost of LUTW light given different current lighting solutions



Note: For conservatism, we included the cost of the first set of replacement batteries in the purchase price (in reality the timing will be after 12 months).

For a more thorough analysis of these figures see the Appendix 2 – Customer Economics.

While the LUTW light will be price-competitive, our differentiating characteristics will be nearly zero operating costs, higher lumens, mobility, and durability of the light. Specifically, we believe our sustaining competitive advantage is that users will be able to extend the hours of light they use per day without increasing their overall cost of light—in fact, consumption can double while only increasing cost by \$2.10.

3.7 *Estimated Market Share and Sales*

Market size: between 998,000 (market vendors alone) or 8,400,000 (includes women home entrepreneurs and nomads).

We estimate that we can sell lights to 60,000 market vendors in year 1 (of rollout, not of pilot). This represents a 5.0% market share for market vendors alone and .5% market share including home entrepreneurs and nomads.

Both profitability and market share gain depend on the success of marketing agents in signing up retailer partnerships and the success of retailers in selling lights to target customers, as will be discussed in the business model section.

4 The Economics of the Business

4.1 Business Model

At the most fundamental level, we need to provide a product to our customer at a price where they still enjoy great value, and yet this generates enough cashflow for all the external suppliers in the business as well as covering the LUTW overheads.

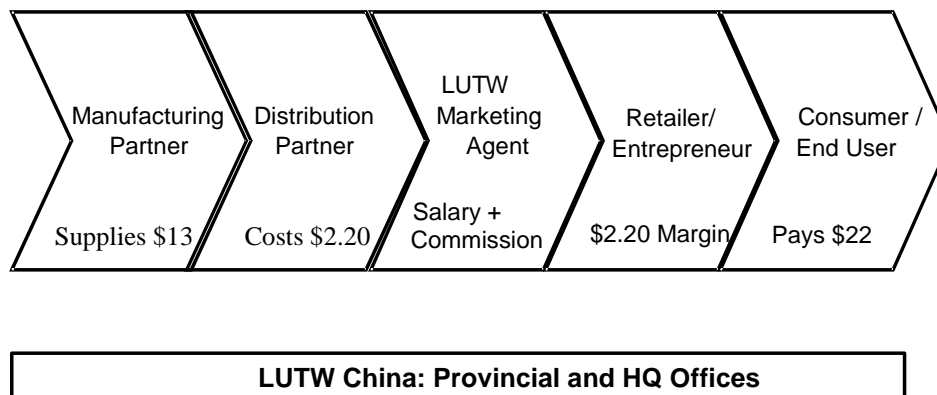
We acknowledge that it will take donor funds and investment to create the market, both establishing a retail network and building credibility with end customers (see Section 13 – Pilot Project). This business plan and analysis looks out 2 years from launch to analyze whether the steady state economics are sustainable.

In modeling this complex system we have based it on a snap-shot of the business 2 years after launch, where there are 6 provincial offices set-up and annual sales of approximately 60,000 units.

We have looked at the economics of the business at different levels, to make sure that all the steps in the supply chain are motivated to support the business and adequately rewarded. The 5 levels that we considered were:

- End Customer (ie Night Market Traders)
- Local Retailers (ie the shops / stalls where our product is sold)
- Local Marketing Officers (ie Staff of LUTW that build the retail network)
- Distributor (ie the company that will move our product around China)
- LUTW China Provincial Offices and Overall (ie our own infrastructure)

LUTW SUPPLY CHAIN



In this analysis, we do not cover the economics of the Manufacturer (this is exclusively covered in the Global Report). Our business model assumes receipt of manufactured product at port of entry (if manufactured outside of China) or from the factory door if sourced inside China.

In building up the model, we have focused on ensuring that the economics work for each level. We started with the end customer, then the local retailers, then the LMOs (ie from the customers all the way back to the central office). Balancing it this way, means that the “plug” is at the LUTW Office level. So our

first goal when feeding and evolving our assumptions was to create a system that supports all of the levels (ie positive gain) and at worst breaks-even at the LUTW level.

If we examine all of the units of analysis, we see that 4 out of 5 are financially rewarded as part of the business:

CHINA - Single User - Night Market Trader
Motivation for each Unit of Analysis

Source: Model Vers 8

<u>Level</u>	<u>Gain or Motivation</u>		<u>Positive?</u>
	<u>Yuan</u>	<u>(\$)</u>	
Unit of Analysis = Market Trader (Customer)	<i>previously covered in customer section</i>		Yes
Unit of Analysis = Local Retailer	336	\$ 42.06 ie annual profit	Yes
Unit of Analysis = Local Marketing Officer	12,234	\$ 1,529 ie annual salary	Yes
Unit of Analysis = Distributor	18	\$ 2.20 per unit (=10% margin)	Yes
Unit of Analysis = LUTW China	(426,503)	\$ (53,313) ie annual profit / (loss)	No

Therefore the latest iteration of our business model is making sense for all of the parties involved except for the overall business. This is working out at a loss of approximately \$0.90 per unit sold.

4.2 Pricing

Following feedback from guests, the field and analysis [see Section 3.6] we have set the initial price of the system at \$22.

CHINA - Single User - Night Market Trader
Pricing Sheet

<u>Level</u>	<u>Inputs</u>		<u>% of Retail Price</u>
	<u>(retail)</u>	<u>(direct)</u>	
Retail Price	\$ 22.00	\$ 22.00	100%
Mark-up for Retailer	\$ (2.20)	\$ -	10%
Implied Price to Retailer	\$ 19.80	n/a	90%
Distribution costs within China	\$ (2.20)	\$ (2.20)	10%
Manufacturing costs (inc margin and delivery to China))	\$ (13.00)	\$ (13.00)	59%
Implied Margin for LUTW	\$ 4.60 (retail)	\$ 6.80 (direct)	21% / 31%

Source: Model Vers 8

We believe that a price of \$22, or 175 Yuan, is the minimum that we can manufacture, distribute and sell the system for.

As we described in Chapter 3 (The Customer), we believe that the cheaper we can create this product, the more people we will reach. And, when placed against our objective of reaching as many poor rural consumers as possible, our goal was to create a light system for much less than this.

However, we still believe that at this price point, it does provide value and affordability to some segments of the population.

4.2.1 Margins

Through research and conversations we have structured the margins for retailing and distribution at 10%.

In particular, we were concerned about the distribution costs, as there are many aspects of the business that make it difficult to predict accurately. We discussed the batch sizes, distances, weight and size of the products with Prof Hau Lee (Stanford University, Supply Chain Professor). He estimated that somewhere between 8-12% of retail price was likely to be appropriate.

4.3 Profit Potential and Durability- Steady State Economics

To simplify the analysis in modeling this complex system we have based it on a snap-shot of the business 2 years after launch, where there are 6 provincial offices set-up and annual sales of approximately 50,000 units.

CHINA - Single User - Night Market Trader		
Profit and Loss		
Financials	Steady State	
Revenue		
Lamps (Ret)	\$1,094,860.80	
Lamps (Dir)	\$121,651.20	
Batteries	\$0.00	
Chargers	\$0.00	
Total Revenue		\$1,216,512.00
Expense		
Mfg/Procure		
Lamps Systems	\$813,196.80	
Total Mfg/Procure		\$813,196.80
Transportation		
Lamps Systems	\$137,617.92	
Total Transport		\$137,617.92
Marketing		
National Adv	\$20,000.00	
Local Offices	\$239,635.20	
Total Marketing		\$259,635.20
Overhead		
Administration	\$56,250.00	
Space	\$1,875.00	
Communication	\$1,250.00	
LUTW China Ohd		\$59,375.00
Total Expenses		\$1,269,824.92
Net Income		-\$53,312.92

Source: Model Vers 8

As can be seen, this is effectively break-even to the accuracy that we can predict today. This is a loss of less than one dollar per unit.

To note: The lamp systems are sold to retailers at \$18.80, so the top line revenue on the LUTW income statement is after retail margin is paid.

4.4 Fixed, Variable and semi-variable costs

The most important assumption that we are making is that we can view the manufacturing costs as 100% variable. We appreciate that if we increase our order quantity by the order of 10X that it will make a difference, but within the range of quantities that we are discussing we have assumed that the costs are all variable. Implicit in this assumption is that we are outsourcing the manufacturing of this product, and paying for it on a per unit basis. Obviously, this means that our contractor will likely absorb the fixed costs of PPE and add a margin in charging us per unit.

For simplicity we have also assumed that the retailer margin and distribution costs do not change with quantity. We feel comfortable initially with this assumption for the retailers, as our plan to reach scale depends on building a larger network of retailers as well as increasing the throughput of each retailer.

Whilst this may hold for the retailer, there will be definite economies of scale for the distribution channel – especially when we compare the pilot project with the roll-out steady state business. To handle this, we have introduced an “inefficiency cost” per unit, during all stages of the pilot to reflect that distribution channels and other business functions will be sub-optimal at smaller volumes.

From the pricing section above, we see that after distribution, retailer margin and manufacturing costs are taken from the sales price, there is a margin left for LUTW. This margin needs to cover all of the expenses that fall under the LUTW organization.

The per unit analysis below is very illustrative of where the major costs are within the LUTW organization:

CHINA - Single User - Night Market Trader	
Per Unit Analysis	

So from above:

Implied Margin for LUTW	\$	4.60	(assumes retail channel)
Weighted ave Margin for LUTW	\$	4.80	(includes slight lift from direct sales)

Currently in the model the annual unit sales are: 60,826 (NB. Excl 8% extra in system)

That needs to cover:

<u>Additional Buffer Units in System</u>			<u>Totals from prev sheet</u>
Extra Units * (Mfg + Distr)	\$ 0.43		\$ 26,266
		\$ 0.43	
<u>Provincial Offices</u>			
Marketing Staff			
Base Salary	\$ 0.89		\$ 54,000
Comssn Salary	\$ 1.38		\$ 83,635
Travel + Comms	\$ 0.44		\$ 27,000
Advertising	\$ 0.25		\$ 15,000
Administration	\$ 0.89		\$ 54,000
Space	\$ 0.06		\$ 3,750
Communication	\$ 0.04		\$ 2,250
		\$ 3.94	
<u>LUTW Head Office China</u>			
National Adv	\$ 0.33		\$ 20,000
Administration	\$ 0.92		\$ 56,250
Space	\$ 0.03		\$ 1,875
Communication	\$ 0.02		\$ 1,250
		\$ 1.30	
		\$ 5.68	

Source: Model Vers 8

As can be seen, as the model stands the expenses are greater than the weighted average contribution margin. This translates to a loss of \$0.90 per lamp system and ties closely to the loss of approximately \$53,000 shown in the P+L.

It should also be noted that there is no contribution from LUTW China to LUTW Global.

When we examine the largest costs, we see that the majority of them are labor costs:

- with a commission biased salary, the costs of the Provincial Marketing Staff on a per unit basis are fairly well pinned. I.e. \$1.38 per unit sold plus a semi-fixed cost of their base salary that is spread over their sales. At the expected performance level, that is estimated at \$0.89 per unit (approx 40% of their total compensation).
- the administration costs are also a mix of fixed and variable. I.e. with increases in the number of units sold, the size of the administration will increase but will perhaps offer some economies of scale.

4.5 Launch Costs

As we currently understand our markets, our manufacturing costs and our organization costs we cannot see the business reaching break-even in the short term. In steady state, the business is very close to break-even; making a loss of approximately \$53,000 on revenues of \$1.22m (losses of 4%).

In addition to steady state, it is important for us to estimate the costs associated with a pilot program and the launch of the business.

For more details on the Pilot, please refer to Chapter 13 – Pilot Program.

Generally, this business should have fairly low additional costs associated with a launch. The reason for that is that the organizational structure is fairly modular; ie we can build into one province at a time, or hire one more LMO who can recruit a new collection of retailers. For these reasons, our additional costs associated with the launch phases are:

- Promotion costs
 - o E.g. product giveaway, or building a demonstration team that tours certain regions in Sichuan to life product awareness, or price reductions.
- Inventory Buildup
 - o This is in two forms. Firstly, we would want additional product in the supply chain, so that there is never a shortage.
 - o Secondly, we may need to buy larger runs of products that we will actually sell in the first year. In that case, the costs of those larger runs will need to be paid for up front. Having the flexibility to produce small initial quantities, is definitely something that we would look for in our supplier.

CHINA - Single User - Night Market Trader				
Launch Costs				

Source: Model Vers 8

	<u>Pilot</u>	<u>Year 1: Launch</u>	<u>Year 2: Rollout</u>	<u>Year 2+: Steady State</u>
<u>Business size</u>				
Provinces	1	2	4	6
Total LMOs	7.5	21	48	90
Retailers signed up	20	288	922	1,728
Units sold per year	400	5,760	18,432	60,826
<u>Economics</u>				
Revenues	\$ 7,920	\$ 114,048	\$ 364,954	\$ 1,216,512
Labor Costs (HQ)	\$ (11,875)	\$ (23,750)	\$ (41,563)	\$ (59,375)
Labor/Ohd Costs (Prov Off)	\$ (10,000)	\$ (20,000)	\$ (40,000)	\$ (60,000)
Labor Costs (LMO)	\$ (13,720)	\$ (38,415)	\$ (87,805)	\$ (164,635)
** Promotion Costs	\$ (4,000)	\$ (57,600)	\$ -	\$ -
Advertising Costs	\$ (12,500)	\$ (19,000)	\$ (26,000)	\$ (35,000)
COGS + Transp.	\$ (6,080)	\$ (87,552)	\$ (280,166)	\$ (950,815)
** Inventory Buildup	\$ (12,160)	\$ (87,552)	\$ (56,033)	\$ -
Net Net	\$ (62,415)	\$ (219,821)	\$ (166,614)	\$ (53,313)

** = Costs associated particularly with the pilot / launch phase.

4.6 Funding Requirements

As can be seen in Section 4.5 Launch Costs, LUTW China would require approximately \$600,000 over the first 3 years to get it up and running and then approximately \$50,000 per year after that. The \$600,000 would largely be to build a retailer network, create an established market for the product and cover cashflow requirements, particularly with respect to inventory cashflow.

That is from our vantage point today. And without the Pilot. The confidence interval on the existing model, with existing assumptions is much greater than +/- \$50,000. That essentially means that the steady state model that we have built reflects a business that is very close to breaking even.

We strongly believe that the goal of the pilot program would be to test many of these assumptions, and would position LUTW Global to much more accurately and intelligently evolve a business strategy. Within 6 months of a pilot program, much of these predictions would be redundant.

4.7 Progress to Reach Positive Cashflow

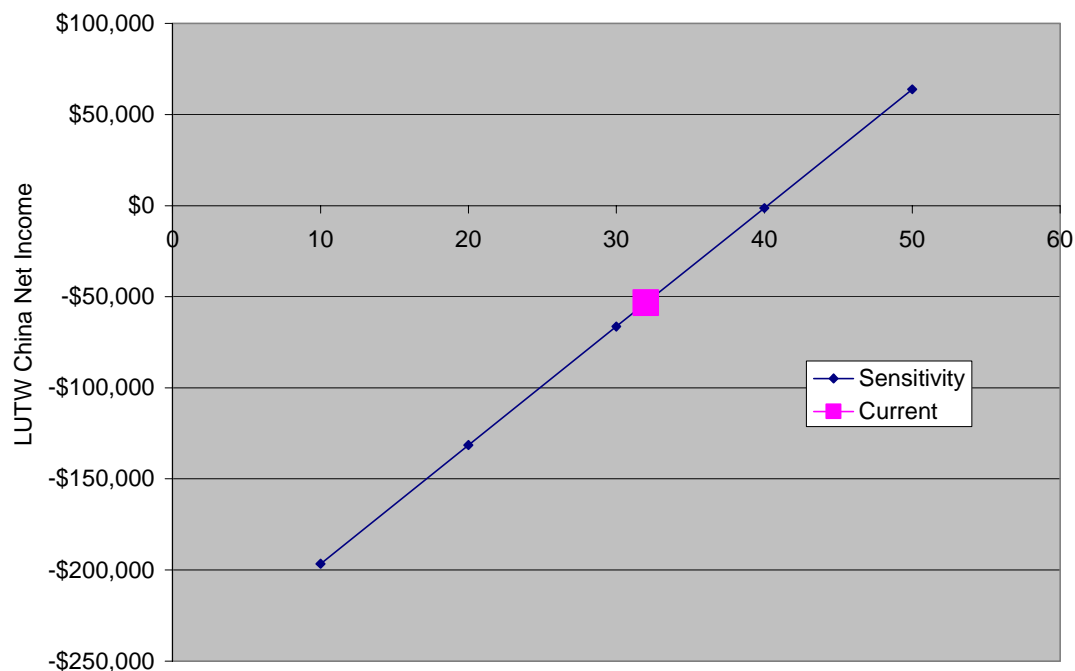
There are a lot of assumptions in this model that effect the cashflow. Here are the most important:

- Performance of the sales force
 - o Units sold per retailer
 - o Success rate of salesforce in signing up retailers
- True manufacturing costs
- Retail price that we are actually able to sell this product for
- Sensitivity of demand to price (ie elasticity)
- Distribution costs within China

Analysis in the financials section will talk to all of these key assumptions and our comfort level with them. The financial analysis section will also show how the key variables drive our sensitivity to breaking even.

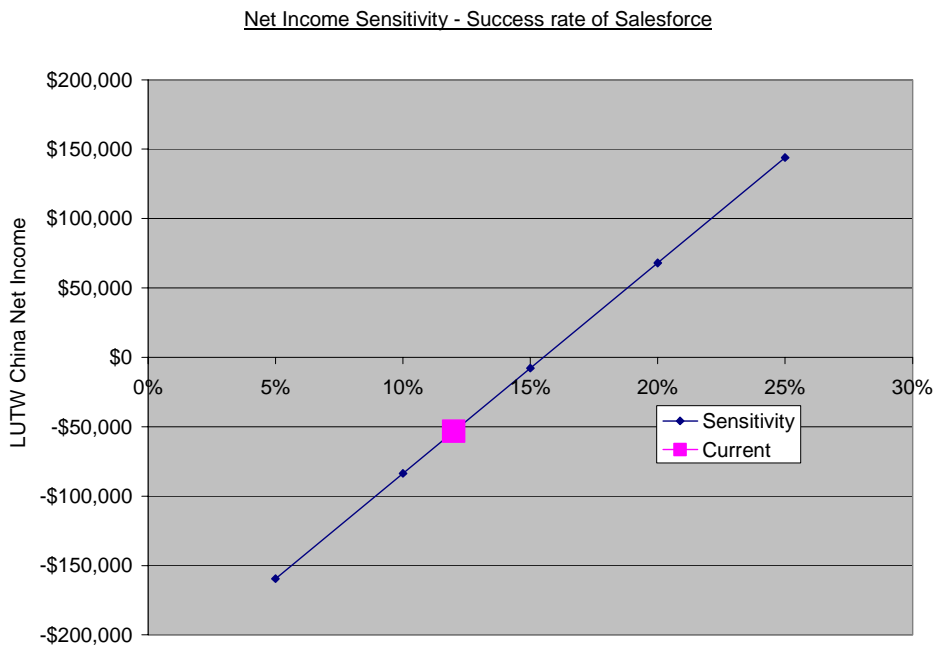
4.7.1 Sensitivity Analysis – Units sold per retailer

Net Income Sensitivity - Units Sold per Retailer



As can be seen in the diagram above, the retailers would need to increase their sales from 32 units/year to 40 (+25% increase) in order for the steady state model to break-even.

4.7.2 Sensitivity Analysis – Success rate of Salesforce



We are currently assuming that the salesmen (LMOs) will sign up a retailer in about 12% of all visits. That translates to each LMO managing 19 retailers. We felt that that was a fairway estimate for the early stages of the business.

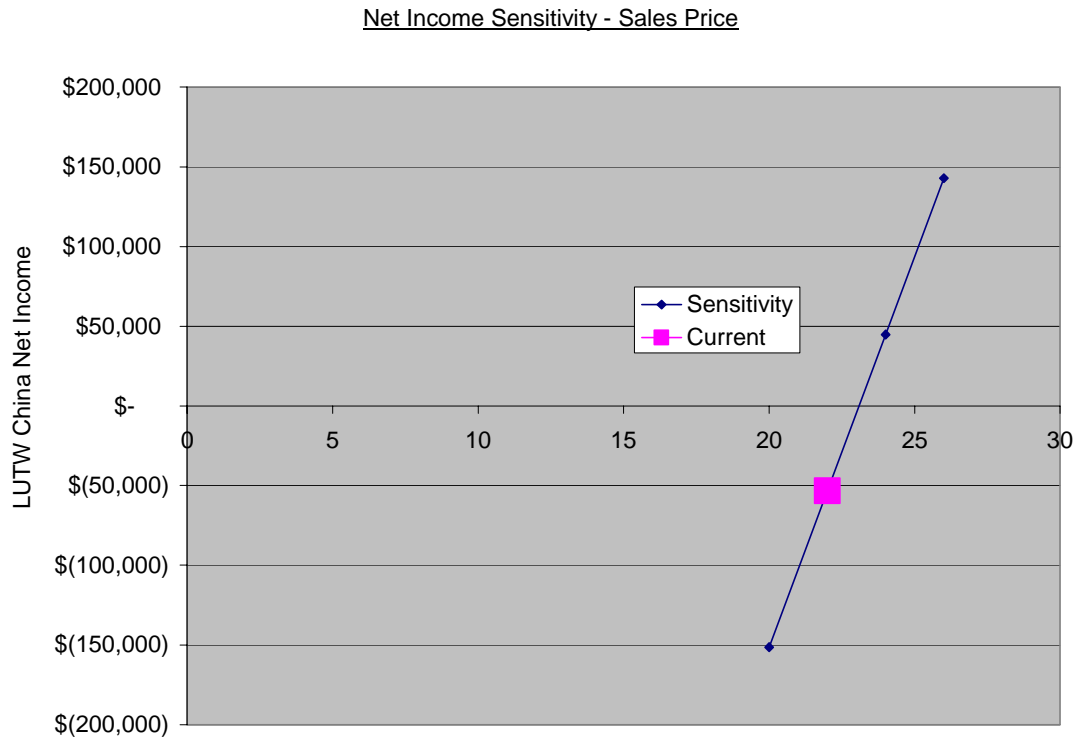
However, if this increases to 16% (+40%) and each LMO would manage 25 retailers, then the steady state model breaks even. This starts to make us feel optimistic about how the business could perform once a large retail base is established.

4.7.3 Sensitivity Analysis – No of Administrators at Provincial Office

In Section 4.4 Fixed, Variable and semi-variable costs, we examined what costs consumed the majority of LUTW's margin. One of those costs was the administration at the Provincial Offices – ie the salaries of managers who recruit LMOs, train staff, manage the supply logistics and run the accounts in the office.

In the model, we currently assume that we need 4 administrators in each provincial office. Our analysis shows that even though the administrators are a significant cost, reducing them even by half to 2, only reduces the net income loss from \$53k to \$28k.

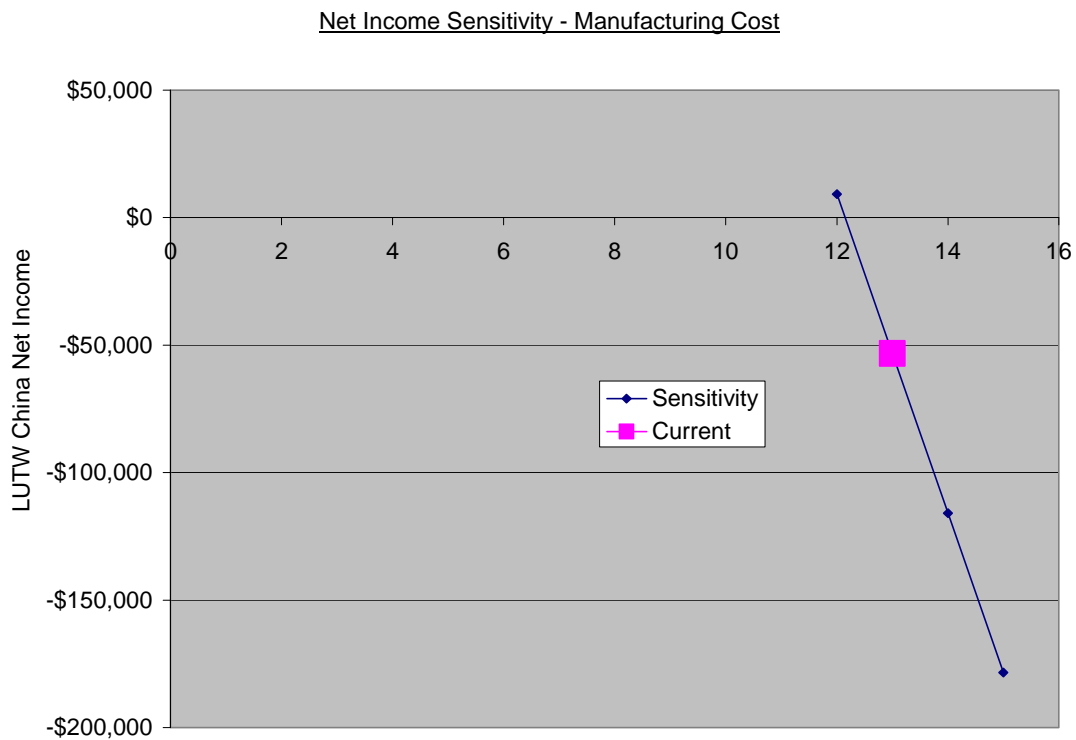
4.7.4 Sensitivity Analysis – Sales Price of Product



Holding all other things equal, the success of this business is extremely dependant on sales price. This assumes a constant 10% transportation and retail margin. Therefore 80% of the increase in sales price goes straight to the bottom line.

This also assumes constant volume, so this does of course oversimplify the situation, as the greater the sales price the lower the volume. So what this is really saying is IF we could sell the same volume at a slightly higher price, then we can break-even.

4.7.5 Sensitivity Analysis – Cost of Manufacturing



The profitability of the business is extremely sensitive to manufacturing cost as well. This is for similar reasons.

Any increase in manufacturing costs immediately detracts from the LUTW margin and hence the bottom line.

4.8 Breakeven Chart – Summary of Sensitivities

The table below summarizes the graphs on the previous pages and compares how sensitive our profitability is to these key assumptions.

The table below shows for the key assumptions, how much they need to change (holding all other things constant) in order to break even:

CHINA - Single User - Night Market Trader Breakeven Analysis

Source: Model Vers 8

So, the model is currently predicting a 'steady state' view, where

Total Annual Sales of Units =	60,826 light systems
Net Income for LUTW China =	\$ (53,313)

If we kept all other things constant, then the main assumptions would have to change by the following amount, in order to breakeven.

<u>Sales</u>	<u>Current</u>	<u>B/Even</u>	<u>Improvement</u>
Number of Lamps sold / retailer	32	40	+ 25.0%
Success rate of the Salesforce	12%	15.20%	+ 26.7%
Lamp price to Market Trader (end customer)	\$ 22.00	\$ 23.10	+ 5.0%
<u>Costs</u>	<u>Current</u>	<u>B/Even</u>	<u>Improvement</u>
Mfg/Purchase Cost Per Lamp System	\$ 13.00	\$ 12.10	-6.9%
Commission Salary per unit (Yuan)	11	4	-63.6%
Number of Administrators (in Prov Office)	4	0	n/a

This should illustrate to the team who runs the pilot program that the two key variables that LUTW needs to control are:

- The Price Point at which this lamp retails. A small increase in sales price (5%) will help this business breakeven. [For conservatism, this assumes that retail margin and transportation costs increase as a constant proportion of retail price]
- The Cost of Manufacture. Just a small decrease in Mfg Cost of 7% goes straight through to the bottom line in savings, and helps the business break-even.

5 Product and Technical Details

5.1 Form

The light is intended to accommodate multiple uses, including: hanging from the ceiling at a night market or household to light a table or work area, mounting to a bicycle for riding at night, carrying as a flashlight, and hanging from a wall. The light will include a moveable lens to focus the light into a brighter area for "task" lighting during reading or housework or when used as a headlight. When the lens is not used, the light will be diffused evenly around a small room and is sufficient for displaying goods or socializing.

The essential form is a small cylinder with a bracket or hook to be used as a handle. The light is intended to be a base unit with a capacity to be a modular system. Those who can afford a more powerful system have the option of purchasing multiple lights and using them simultaneously. We found that placing two lights 1-2 metres apart is more effective than using 2 LEDs in the same housing.

5.2 Components

The core of the current light design is a single 1 Watt LED. We have chosen this as a minimum acceptable intensity of light. The remaining components have been chosen to minimize cost while allowing the light to be used for a variety of tasks.

The LED is powered by two AA NiMH (Nickel Metal Hydride) rechargeable batteries. The current is regulated using a simple microprocessor that also acts as a low-battery shut off to prevent deep discharges.

Additional components include: push-button on/off switch, battery housing/leads, external housing, clear cover/optic lens, and an attached solar panel. Product housings will be manufactured out of two injection-molded plastic parts that are screwed together.

The charging unit is a small amorphous photovoltaic panel. This panel will be a stock item available only in a single lamp size.

5.3 Summary of key design requirements and assessment of solution

The key design requirements are based on a target user of a market vendor, nomad, or rural household. The light must accommodate multiple uses including: reading/studying, general housework or socializing, outdoor travel at night, and lighting goods at a night market. The proposed solution uses a focusing lens with "on/off" positions to allow for both focused and ambient light.

The light must allow for up to 4 hours of use on a single full charge. Currently the light with 2 AA batteries will provide this amount of light per charge.

The light must be durable enough to permit daily use in harsh environments for at least one year without failing. The light will possibly use only one moving part (the focusing lens) to minimize joints as well as a single connection point between the solar panel and the batteries. A plastic injection-molded housing will be durable enough to withstand being dropped from the height of an 8 foot ceiling without breaking.

5.4 Technology evolution summary for each of the key technologies employed

The key technologies employed are solid state LED lights, rechargeable NiMH batteries, and solar panels. The LED light is evolving most rapidly. Current estimates project light output per Watt to double in the coming year, and more powerful (2-3 Watt) reliable LEDs may be available within a year. The more powerful LEDs would then require a significant redesign to accommodate more batteries, but a more efficient 1 Watt LED could be used with the current design without altering other components.

Currently Lumileds is dominating the market for 1W LEDs with superior reliability and efficiency. However, competitors will likely develop the same technology (or better) within a year. This will drive costs down and create a larger selection of options for the LED components.

Battery technology is also evolving. Energy density is increasing for a given battery size. The proposed design makes use of a recently developed battery with a storage capacity 50% higher than current designs.

Solar panel efficiency is continuously increasing, although historically this has been a very slow process. Most likely, technical advancements will impact cost more than performance.

5.5 Development Status and Tasks

The status of the light design is still in early stages of development. Circuitry and microprocessor code is complete. Housing designs and manufacturing processes are being developed through foam prototypes, CAD models, and Fused Deposition Modeling (FDM).

Given feedback from our target users, and the design constraints presented by the need for a sustainable business model, we arrived at the present form and function of the light. The new design will then be sent back to our users in the field for more testing. This will tell us whether or not the form suits their needs. It will also give us an indication of the users' emotional response to the light—do they find it desirable at all?

As more information comes in from our users, our understanding of their environment increases. To this end, a weathering test will be required to understand the light's performance under extreme duress. For example, it still snows in regions of Sichuan province all the way through May and into June. A heat and cold test would indicate whether the whole system could withstand such extreme conditions.

One concern about the light is its access to the batteries. That is, the user should be able to access the batteries easily, but not the rest of the parts. This minimizes the risk of damaging the LED light, or the solar panel; it relieves the user of the onus of having to buy a totally new system from scratch (see Section 5.6 below).

Once a satisfactory design has been finalized, a manufacturing plan will be created to understand how to produce the new design in the most cost effective manner.

Key tasks include: Finalizing a housing design and a reliable movable lens. Integration with the solar panel connector is also a critical task.

5.6 Difficulties and Risks

LED and photovoltaic technologies present significant risks. The LED technology currently used is very new, and long term reliability information is sparse. The specific LED component is currently in high demand (there are no competitors currently offering a comparable product) making supply and lead times a considerable risk.

Photovoltaics present a risk in preparing for maintenance needs. These components are a significant portion of the overall cost, and there would generally be no way to repair the panel in the field. In general the users of these lights may be unfamiliar with the technology, and simple problems may become more complicated in remote areas. Naturally, solar power is very sensitive to weather, and some regions may see reduced performance because of prolonged poor weather. At the present time, it is difficult to make a weather-proof light due to budgetary constraints. An alternative is under development.

Batteries are also susceptible to decreased performance due to weather; in this case, cold temperatures. In general, cold temperatures require slower charging and may decrease the usable capacity. This is a concern primarily in Nomadic regions of Western China where the users would be at high elevations. Batteries also require specific charging and discharging conditions to maintain a long life without significant degradation. The microprocessor should allow for proper control of charging and discharging,

but a user who is unfamiliar with rechargeable battery technology may not be aware of other risks. One example would be placing standard alkaline batteries in the light and trying to charge them. This would cause significant damage to the devices.

The largest additional difficulty is in predicting usage conditions. These lights will be sold in areas with exposure to heat, humidity, smoke from fuel-based energy, and other unknown factors. Significant testing will be required to validate the designs necessary durability. Because these lights are intended to be used daily for a wide range of tasks, they will be exposed to indoors and outdoors and will be handled frequently. This is a very different scenario compared with flashlights used only for emergencies, and the resulting risk of inadequate durability must be addressed.

5.7 Product Improvement and New Products

As our team continues to provide our users (namely night market vendors) with prototypes, our users will continue to provide our team with feedback. By understanding this feedback, and incorporating it into an iterative design process, we hope to continue to evolve our product over time. New products that could potentially change our current product would be the development and production of newer lights using more efficient LED components and lower cost manufacturing processes for higher quantities.

Future products may also incorporate additional sources of power generation, such as larger scale solar panels, human power, or micro-hydro power. These light systems could be installed as a lower cost solution for larger groups of people or communities. For example, a single, large power generator could be shared by 10-20 light owners, or operated as a micro utility enterprise.

5.8 Costs

The table below reflects our best estimate of the product costs. It shows the breakdown between the different components, as well as the cost of final assembly.

Light Components	Cost
Luxeon Star	\$3.00
Battery (2 x AA NiMH, 2Ahr, \$0.60 each)	\$1.20
Circuitry & internal wiring (including jack for ac adapter)	\$1.50
Housing and Optics	\$1.50
Power Generation (1.2W solar panel)	\$3.00
Light Subtotal	\$10.20
Assembly and Shipping	\$1.00
Margin for Manufacturer	\$1.80
TOTAL Manufacturing Cost	\$13.00

At this stage, these assumptions are only assumptions. This estimate is probably accurate to +/- \$2.00 which as we showed in Section 4 has huge implications on the economics of the business. That is why grounding this cost, is one of the top priorities of any pilot project.

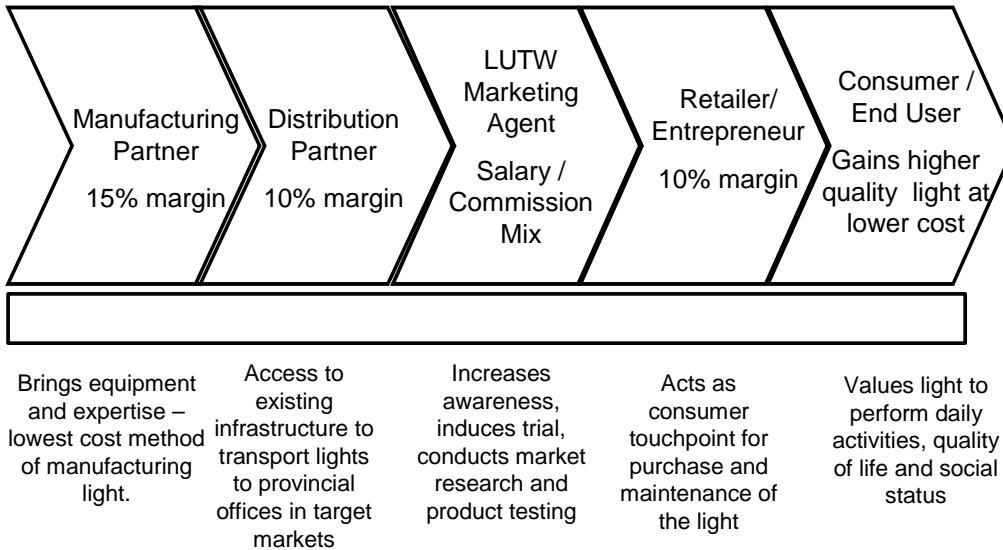
5.9 *Proprietary Issues*

Some proprietary issues that we may encounter involve the software that's used to program the driver circuitry for our LED. We are currently pursuing the development of in-house software that could be used without restriction.

As well, we are currently using Luxeons™ for the LED component, which are proprietary to the Lumileds Corporation and comparable competitive products are not readily available.

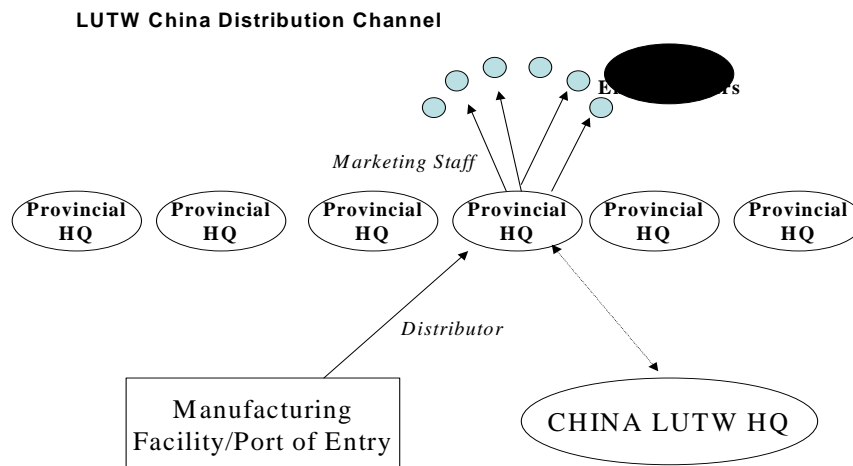
6 Distribution Plan

6.1 The Supply Chain



6.2 Distribution Strategy

Our distribution strategy is based on creating as few layers as possible in the distribution chain. Rural China has its own distribution channels largely outside of urban China with different goods and a high reliance on keeping total mark-ups low. The central market of each rural city, township, and village are the most typical channel through which goods are purchased locally. Rural consumers also travel to larger towns and cities with department stores about once a year to make larger purchases and for entertainment. Therefore, LUTW China’s distribution strategy is to partner with local retailers, most likely market vendors within the central markets to distribute lights. LUTW’s distribution channel is outlined



below:

6.2.1 Product Flow

If the lights are manufactured outside of China, LUTW Global will manage transportation of the lights to China. At the first port of entry, LUTW China will take over responsibility for the lights and contract with a distribution partner to transport lights to each of the provincial offices. At the provincial offices, there will be a space for inventory, as we do not expect that a separate warehouse will be necessary for the first couple years. The provincial headquarters will manage distribution of lights to retailers through LUTW LMOs. The provincial headquarter will reorder lights from LUTW Headquarters (who in turn will order lights from contract manufacturer or LUTW Global). The provincial headquarters will also aggregate feedback from the field related to product design, defects, and reception of the product across different target markets. This feedback will then be communicated to LUTW Headquarters and incorporated into future products and marketing plans. As touched on before, LUTW LMOs will obtain lights at their provincial offices and transport them to local retail partners or entrepreneurs who have contracted to sell lights with LUTW China. LMOs will earn both a salary as well as a commission based on how many lights are sold by their partner retailers. This will incent LMOs to not only sign up retailers, but continue to market to local consumers and keep retailers well-stocked with lights.

6.2.2 Money Flow

The Money Flow will not be an exact reverse of the product flow as we expect that payments will occur at different points in time. LUTW Global will independently negotiate payment plans with both the global distributor and contract manufacturer. LUTW China headquarters will negotiate payment plans with in-country distributors. We anticipate that many retailers will purchase lights to sell on credit. The provincial offices will approve potential retailers credit and handle collection, with guidelines and supervision from LUTW China Headquarters. The risk of this system is that it delays cashflow from reaching provincial headquarters. This will be an issue that will need to be closely monitored in the pilot project. Retailers can make payments either through their LMOs or directly to the provincial office.

We selected this strategy for the following reasons:

- It is prohibitively expensive for LUTW to either manufacture or transport the goods to all the provincial offices themselves. This would require purchase of machinery, trucks, hiring of many fulltime employees, etc.
- Having the provincial offices act as the point of distribution into the rural villages allows for communication flow back from “the field” in that LMOs will return to fill orders and at the same time can communicate information such as product design complaints, most successful villages for sales, “best practices” in marketing, and specific target groups that have responded well to the product.
- In order to keep retail prices down, LUTW needs to limit the number of parties in distribution chain. Limiting the quantity of partners in the distribution chain also limits the “value” or margin that must be created for each party.

Other models that were considered were:

1. **Pure Retail Partnership** – ie partnering with an established retailer and allowing them to control marketing, sales, distribution and accounting. In this model, we would essentially just provide the product. Specifically, rural consumers travel to larger towns/cities within the province yearly or every other year to shop. Also, companies such as Walmart and Amway are expanding operations in China and could be good potential partners. This has the lowest set-up cost, as there is very little infrastructure. However we decided against this because there is no control of the sales message. We believe that in order to drive adoption, at least initially, that the purchasing experience needs to be high touch e.g. product demonstrations, innovative shows in markets etc.
2. **SELCO Model** – SELCO have established their own retail network to distribute their higher end home lighting systems. This involves actually creating shopfronts that are branded and run by SELCO. Whilst this works for them at their price-point of \$350-\$1000, this introduced too much infrastructure and up front capital expenditure for our business model.

6.3 Key Distribution Steps

- Increase the success rate of both LMOs and retailers. This will be the single most important aspect of distribution and will determine profitability of the LUTW China. In short, the success that marketing agents have in signing up retailers, and the success that retailers have selling the light will determine the profitability of LUTW China.
- Establishing strong distribution partnerships.
- Ensuring adequate stock of lights in the field. This will take good communication from the field, through the provincial office, and to LUTW China headquarters.

Incentives are highly aligned in this model. Middlemen are receiving industry standard margins, and both the marketing agents and the retailers benefit financially on sales to consumers.

6.4 Local Logistics

Local logistics are one of the most difficult aspects of the business plan to build remotely. Therefore, we believe that testing different models of local logistics and ensuring the most efficient system will be a key part of the pilot program.

The key aspects to local logistics will be:

- Coordinating marketing efforts between LUTW LMO and retailer. The LMO must not only promote the light but also make it clear where and from whom to purchase the light in the town. Retailers must be aware of the specific product information and benefits that are being communicated to potential customers.
- Ensuring that retailers have adequate lights in stock. The retailer should always have at least 3 lights in stock.
- Training retailers in small-scale repair and providing excess stock for defective products (at least one light per retailer).
- Retailers will also need to provide battery replacements for consumers annually and instruct light purchasers not to use alkaline batteries in their lights.
- Providing an easy method for retailers to reorder lights, process payments, and communicate with provincial headquarters both through and in the absence of marketing agents.

6.5 Management of Distribution

Each part of the distribution chain will be managed by the LUTW office at that corresponding level of the distribution chain. Specifically, LUTW China headquarters will manage distribution of goods from the manufacturing facility to provincial offices. Provincial offices, in turn, will manage distribution of goods from the provincial offices to retailers and marketing agents in the field. The provincial office will have staff both in accounting and distribution relationships.

7 Marketing Plan

7.1 Overall Marketing Strategy

The overall marketing strategy is to communicate the benefits of the light to as many potential customers as possible, and at the same time to continually learn about our target market in order to refine the product design and marketing activities. As such, most marketing will occur as close to the consumer as possible. At the heart of the marketing strategy are LUTW Local Marketing Officers (LMOs) who will travel to villages, conduct product demonstrations, and establish partnerships with retailers in each market who will then sell and support the light. We will go into further detail in this section.

The only nationwide promotions that LUTW would undertake are those that, by doing them at scale, would reduce costs for each local effort. An example might be the design and printing of flyers, posters and other marketing materials.

7.2 Pricing

Our initial target goal is \$22US or 175 Yuan. This price includes a light, batteries, and a 1.2W solar panel, all integrated in a product.

7.3 Sales Tactics

Sales tactics will vary widely region by region and it will be crucial that LUTW promotes active discussion of best sales practices across all marketing agents. We anticipate that product demonstrations within the night market will be a consistent sales tactic across all regions. We also want to promote user testimonials, again in a public setting, by people who have purchased and are satisfied with the results.

We do not foresee any immediate price promotions, as we do not want to set a cost expectation in consumers' heads that will not be possible to meet on a sustained basis.

7.4 Service and Warranty Policies

The product will be sold with a 6 month warranty. If it stops working for any reason, it can be returned to the retailer. The retailer should first check they can fix it (their first step should be to double check that the rechargeable batteries are not flat or overused). The LMO will train the retailer in very basic maintenance. If the retailer cannot fix it, the retailer must handover a replacement unit at no extra cost to the customer.

The broken unit should then be sent to the Provincial Office (or picked up by the LMO) and replaced by LUTW China at no cost. It is important that LUTW carries the cost of these faulty products for two reasons:

- firstly to maintain goodwill with the customers and retailers
- to ensure that LUTW learns of all breakages and product defaults.

Therefore it is essential that retailers have a small buffer stock of lights in case of defects or breakages, until the true reliability is understood.

If the reliability rate is above 95% as we hope, then this policy should be revisited to trade off the costs of buffer stocks versus the costs to a customer of not replacing the light immediately.

7.5 Advertising and Promotion

We believe the most successful form of advertising will involve the product, such as demonstrations, spotlights in local media, and testimonials from content users. We also expect word of mouth to be the most powerful source of advertising and promotion.

In China, agricultural and consumer product exhibitions are popular for promoting products between business-to-business. Traders and entrepreneurs from all over the country gather at these events to both promote their own products to retailers and other wholesalers as well as to get a feeling for what trends will be emerging in the market in the coming year. An admission is charged and some just come for the novelty of seeing new products. The attraction of these types of exhibitions is that it attracts huge crowds of people (i.e. 300,000 gathered in a town of 2,000 to attend a recent agricultural exhibition^x) who come from distinctly diverse backgrounds. This means that it will be an ideal place to gauge which segment of the market will be most interested in our product as well as make sure that we are able to expose our product to customers who might have interest in playing different roles in the supply chain of our business. In addition, new partnerships are often formed in this type of atmosphere and it will be a convenient way to carry out networking and expansion. Demonstrations are common at exhibitions. These events are held throughout various parts of China in both urban and rural settings.

Other organizations have been successful in combining entertainment and product information. This includes music shows, movies with product placement, etc. In China, one form of “viral marketing” has been to burn product information and advertisements on compact discs as they are distributed widely. We intend to run a small number of programs such as the compact disc burning, but will put the bulk of energy and money towards product demos, user testimonials, and local spotlights.

8 Manufacturing Plan

LUTW China has simplified its analysis so that it simply receives products from LUTW International.

In reality we anticipate that there are 2 feasible options for a manufacturing strategy:

- 1) Produce in bulk for LUTW International (India or China)
- 2) Produce in smaller quantities in China at local manufacturers.

There will be trade-offs associated with this decision, although we do not feel well placed to influence this decision at this stage:

Produce in Bulk	Produce in Smaller quantities
<ul style="list-style-type: none"> - Expect lower manufacturing costs - Greater standardization across products (one manufacturer) 	<ul style="list-style-type: none"> - Faster response times - Lower final distribution costs - Local goodwill, through increasing local business - Lower import taxes

LUTW China currently has no preference at this stage for either of the options and defers to the Global team, for their recommendation.

Early indications are that products will be produced in China, by a contract manufacturer.

9 Organization

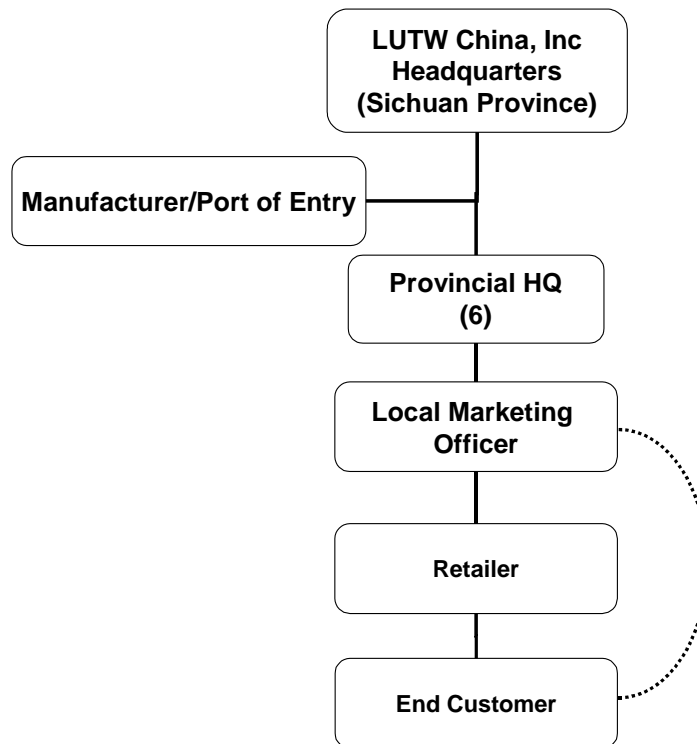
9.1 Organization Structure

The structure that we designed had to fulfill the following functions (either directly or through a 3rd party):

- Product distribution throughout China
- Marketing of product
- Sales
- Fulfillment for repairs and maintenance
- Accounting / Auditing
- HR. ie hiring, training, paying, developing the whole team that will execute the plan.

(Note –manufacturing strategy is handled by the global team report. The LUTW China organization had to be able to receive and transport the goods once made or imported.)

The China LUTW business will be a hierarchical structure with the following layers:



As described in earlier sections, the China business will run 6 independent regional businesses split by province. Each province will report into the country office. Each Provincial Office will then have a team of 15 Local Marketing Officers (LMOs) who are responsible for establishing a network of retailers who could carry the product.

In this model, the key relationship is between that of the Local Marketing Officer (LMO) and the Retailers. The LMOs will initially have to prove to retailers that the product is attractive (both in terms of margin and customer appetite). This they will do by traveling from village to village, meeting with competing retailers and setting up demonstrations for night market traders to show off the product. Once an LMO has signed up a retailer, we are assuming that that retailer will then buy 10-12 products at the time of signing up, and

sell 32 products on average over the first year. Any sales that the LMO makes during initial demonstrations will contribute margin to the retailer to act as an added incentive.

The role of LMO is key to LUTW because this is where the organization creates leverage and scale to reach many end customers. Analysis in the financial section shows how sensitive the business economics are to the performance of this role.

The rationale for selecting this structure was:

- This is in line with the IDE style 'Marketing Company' – ie creating the marketing and sales force to help drive sales, but essentially finding partners to distribute, stock and manage the retail side.
- It provided an efficient way to establish geographical expertise. If necessary we could enter one province at a time.
- This keeps our team controlling the sales message and driving the product demonstrations.
- This keeps our team, at least initially, creating and building the network of retailers.

9.2 Organizational Development Strategy

One of the hurdles to growing this business will be the speed at which the organization will be able to hire and train it's staff. Even though we have designed the business with a streamlined command structure, the model is dependant on recruiting LMOs to establish the retail network and create the first market.

The organization will grow organically in each market, with its Provincial Office as the seed. The Manager of the Provincial Office will start to build the team and will be responsible for training the LMOs on how to perform their role.

Of essential importance will be training them on the product itself. They will be the first contact person with the retailers if anything goes wrong. They must be able to tell if the problem is a quick fix that they can perform or if the product needs to be returned to the provincial office for a full repair. They also need to relay important product information to end users, such as not using alkaline batteries in the light.

In addition, the LMOs must be able to train the retailers on:

- how to demonstrate and sell the product,
- and how to replace the batteries (need to be done annually).

9.3 Units and Functions within the Business

Use 'unit of analysis' approach within each country to describe in detail each of the functions (e.g. Head Office, Local Offices, Marketing Officer etc)

Level	Number of People / unit	Number of Units Total	Primary Function
Head Office	15	1	<ul style="list-style-type: none"> - Accounting - Operations Mgmt (supply chain coordination) - National Marketing Campaigns
Provincial Office	4	6	<ul style="list-style-type: none"> - Operations Mgmt (supply chain coordination) - Hiring and Training of LMOs - Accounting for Region
Local Mkg Officer	1	90 (15/Pr. Off)	<ul style="list-style-type: none"> - Establishing retailers to carry product - Training Retailers on how to demo the product - Helping Demo the product to establish the first sales - Return of faulty products to Prov Office
Local Retailer	1	1,728 (288/Pr. Off) (19/LMO)	<ul style="list-style-type: none"> - Stocking the product - Demo-ing and Selling the product to end users. - Ordering more of the product from Prov Office.
Manufacturer Port of Entry	0	1	<ul style="list-style-type: none"> - Assume that the primary role of either inbound handling (if made outside of China) or outbound shipping from factory (if made in China) can be handled by contractor.

9.4 Key Role within the Business - Local Marketing Officer

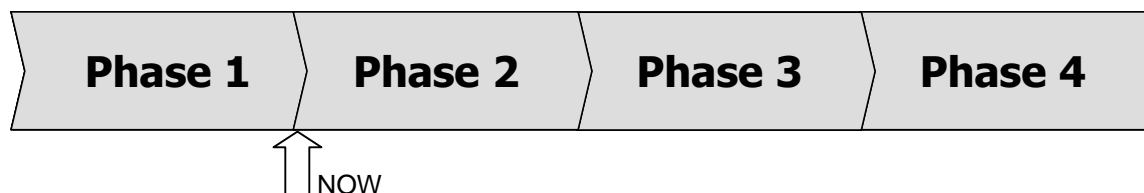
The LMO will be able to sell some products directly to customers, although the organization's preference is to sell through retailers so that the company can really reach some scale.

The LMO will be compensated on a commission based salary. On the assumption that each LMO is able to work with approximately 20 retailers in any one year and driving sales of approximately 614 units per year, their salary would look like:

Element	Amount	Total
Base Salary	4,800 Yuan (= \$600)	\$600
Commission (through retailers) per unit	11 Yuan / unit (= \$1.38)	\$845
Commission (direct sales) per unit	11 Yuan / unit (= \$1.38)	\$85
		<u>\$1,530</u>

So at the expected level of performance we expect 40% of their salary to be base and 60% commission.

10 Overall Schedule



	Anticipated Dates	Key Tasks
PHASE 1 – BUSINESS PLAN SCOPING	January – June 2003	<ul style="list-style-type: none"> • Analysis of attractiveness of different market segments • Identification of distribution systems, marketing plans and pricing for light • Prototype of the light • Compilation of list of Tech and Business Assumptions that need to be tested during Pilot • Initial testing of Assumptions
PHASE 2 – PILOT	June 2003 – June 2004	<ul style="list-style-type: none"> • Make final decision on region for pilot project (Sichuan recommended) and initial prototype to test • Hire Country director for China. It will be KEY for the pilot manager and staff to reside in the country, near the target users. • Begin building marketing staff and partnerships with retailers. • Start a 12-month pilot program in which (1) the light is given to night market vendors in Sichuan for usability testing and (2) the light is sold to night market vendors in different regions on Sichuan to test demand, price sensitivity, and retailer partner relationships. For usability testing, LUTW should select various vendors to test the light and provide feedback on a regular basis. Prototype iteration based on user feedback. <i>{more details in pilot section}</i> • Test all key assumptions, including whether night markets are best target and what distribution systems are best (complete list in Appendix). • Test different price points, to measure how price effects demand. • Develop training program for retailers that includes small scale repair, maintenance guidelines to pass on to consumers (such as do not use regular batteries in lights) • Final decision on light, target group, and distribution strategy. Roll-out to additional provinces.
PHASE 3 – ROLLOUT	June 2004 – June 2006	<p>YEAR ONE</p> <ul style="list-style-type: none"> • Full-scale expansion in Sichaun and Yunnan • Concentrated period of marketing efforts to increase awareness and consumer interest in these 2 provinces • Hire adequate marketing agents in these 2 provinces to reach sales goals <p>YEAR TWO</p> <ul style="list-style-type: none"> • Full-scale expansion in remaining 4 provinces • Concentrated period of marketing efforts in each of these provinces to increase awareness and consumer interests
PHASE 4 – STEADY STATE	June 2006 onwards	<ul style="list-style-type: none"> • Focus on productivity of marketing agents and partner retailers in order to increase profit / reach breakeven • Work with manufacturers and suppliers to reduce costs of LEDs and the light as a whole.

11 Partners and Key Relationships

11.1 *Key supply distribution partners*

Below are the details of people and organizations that we have contacted, established relationships with and believe could serve as valuable partners in any pilot project.

Ralph Flory, Pinetree

Ralph Flory heads a company that looks for ways to help the small farmer in particularly poor areas. They look simple, cheap, practical and otherwise hard to obtain for the local buyer. One of their objectives is to not be competition to the locals. Past projects include selling water irrigation systems in Inner Mongolia. Although this entrepreneurship is also in the starting phases, they have been out in the field for a couple years and partnering with them may give us an insight to the marketing and distribution channels already found. In addition, Ralph has offered to assist in the next round of product in-the-field tests.. (Address is in footnote)^x. Ralph was referred to us by Xiaopeng Luo.

Xiaopeng Luo, IDE China

He is in charge of the China sector of IDE, an international development company that is currently promoting irrigation systems and has worked with irrigation systems as a product. Based in Washington D, C, Xiaopeng manages offices on the mainland. Being mainly a marketing-based company, a partnership with IDE may broaden our customer base through joint marketing efforts.

11.2 *Alternative supply distribution partners*

Below are a list of alternative organizations that we believe would provide great value and insight to the next stages of the project, but we have not been able to establish contacts there.

Avon

Unique sales model in China that we can replicate in our sale of lights. Contact with Avon representative may give us a deeper insight into how realistic such a collaboration may be. This consideration arose from the fact that we wanted to sell our light door-to-door. Avon's success in China with this particular strategy may shed light on how we should structure our own business.

Walmart

Retailing giant is quickly spreading throughout China. The success of this superchain lies its flexibility in the type of consumer goods they are able to sell. Immense volumes also drives down price considerably. One venue for selling the LED light may be through such conventional means. It would not allow us to reach the very poor in the most desolate areas, but it will provide a sound foundation for the penetration of the product in China.

Justco

Japanese based retail superstore caters to the upper class. Stores are supplied with high-end clothing, electronics, and school supplies. This will be a good venue to focus our product to another class of consumers if the multi-tiered pricing scheme is utilized. This chain is not as prevalent as Walmart, though quickly expanding.

Carrier

Retailer chain that caters to the needs of customers who are not able to afford prices at the most high-end stores, but have excess money to spare after going to night markets. The benefit of all these retailer venues is that we can target the price to a specific customer within certain income brackets.

11.3 NGO partners and relationships

Li Bo, Conservational International, Bai Ma Xue Shan National Nature Reserve, Yunnan Province

Since 1994, he has worked on various poverty reduction project in several provinces in southwest and northwest China. Lighting or electricity-related issues is one of the problems he deals with. The Hengduanshan mountain ecosystem has been targeted as one of the world biodiversity hotspots in which conservation of nature and improvement of local livelihoods are not easily compatible to each other. Energy efficiency and delivering of environmentally-friendly energy is strongly sought after as an option to both conserve the environment at the same time people are able to make a decent living. The new initiative that deals with this issue is called Critical Ecosystem Partnership Fund (www.nepf.net). Partnering with such an organization will affect real change to a particularly needy region, though the sustainability of the project will be hard to prolong.

11.4 Research Partners

Below are the details of a two valuable resources that were able to give us insight into customer empathy:

Professor Anthony Mensah, Rengzhou Township, Sichuan Province

Helped us to test out prototypes in rural Sichuan Province and provided us with invaluable insight into the lives of our potential users. He seems very enthusiastic about the project and would be willing to work with us again with future prototypes. Anthony was also able to send us pictures of the rural people he visited along with the field surveys we sent with him that contained a list of questions we had for the users.

Professor Hill Gates, Stanford University

Anthropological Sciences scholar who has done field work with the rural poor in China. She helped us immensely in identifying the first target markets that we wanted to research, such as the women cottage industry workers in rural Sichuan.

12 Critical Risks and Assumptions

At this stage in the business, before one product has been manufactured or sold, there is obviously a wide range of things that are unknown or could go wrong. The purpose of this section is not to make a long list, but rather to offer the team's perspective of where the business is most vulnerable.

12.1 *Our key assumptions*

The Number 1 vulnerability lies with our key assumptions. These are the same ones that we have listed in the Pilot section and the Executive Summary. They are:

- The product can be manufactured for \$13
- The price of the light at 175 Yuan (\$22) is acceptable for our target market
- Night vendors are able to make long term trade-offs, including a higher upfront cost for longer-term savings
- The design of the light meets user needs
- Marketing agents will be able to drive sales by establishing relationships with retailers
- Reliability of the product is over 95% in first year
- The operational structure of LUTW China is able to manage transportation, accounting and logistics.

The purpose of the Pilot Program is to test precisely these assumptions.

12.2 *Quality and Reliability Risk*

Through our research, we have heard a consistent message that if this product is going to be successful then it must be highly reliable (less than 5% failure in 1 year).

The reliability is going to be a function of many factors, some of which are outside of our control. That excuse however, is not satisfactory as the consumer will just understand that a failure is a failure and will not care as to the cause. With that in mind, the Pilot team need to evaluate the following factors that will impact the reliability of the lamp:

- Design for reliability
- Manufacturing process
- How the customer actually uses the lamp:
 - o Frequency of charging
 - o Inside / Outside
 - o Vibrations knocks that it sustains

As important as all of this, will be the feedback loop through which the LUTW team learns of all breakages and product failures. We have suggested that the lamp systems come with a lifetime warranty – whereby any failed products get swapped with a new one – and the failed lamp gets passed back up the supply chain to the Provincial Office. This learning loop is essential if the business is firstly going to be able to even measure and quantify reliability and secondly improve the product design.

12.3 *Comprehensive list of assumptions*

In the Appendix, is a list of the top 30 assumptions in the business model.

13 Pilot Project Recommendations

13.1 *Pilot project Description*

Goals

- Establish an initial market in the region
- Gain experience about how best to operate offices on the ground
- Test the validity of our target market and the location
- Establish further connections with partners

Location: Western Sichuan Province (specific village to be determined)

Target Market:

There will be two targets for the pilot. (1) A set of Night Market Vendor “test users” that will use the light in daily activity and provide feedback to LMOs. (2) Shopkeepers and retailers in the more densely populated regions of Sichuan and the night market vendors in more widely dispersed and rural areas. The idea is that the retailers will eventually take over a large portion of the sales to the night market vendors. The role of this pilot project is to get both markets familiarized with the technology, to begin sales, and to test price sensitivity, the best partnership structure, and distribution systems.

Duration: The Pilot should last 6-12 months, or until enough sales are made to substantiate an expansion of operations.

13.2 *Key assumptions to be tested during pilot project*

The purpose of the Pilot Program is to test exactly these assumptions.

- The product can be manufactured for \$13
- The price of the light at 175 Yuan is acceptable for our target market
- Night vendors are able to make long term trade-offs, including a higher upfront cost for longer-term savings
- The design of the light meets user needs
- Marketing agents will be able to drive sales by establishing relationships with retailers
- Reliability of the product is over 95% in first year
- The operational structure of LUTW China is able to manage transportation, accounting and logistics.

13.3 *Methodology / operations required to test assumptions*

Before the establishment of a country office, in the initial stages, the on ground office will double as both the LUTW China main headquarters and provincial office. Depending on the success of this project other provincial offices will be opened, while the one in Sichuan will remain as the country headquarters.

13.4 Budget for pilot project

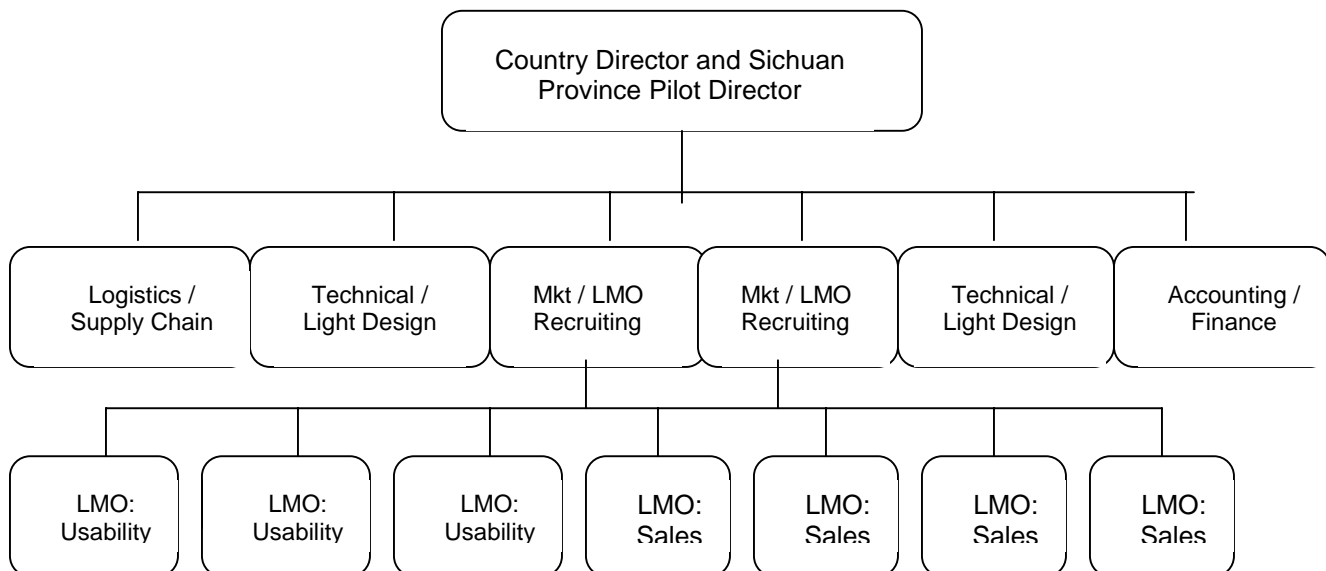
Here is our estimate of the costs needed to run the pilot for 12 months:

<u>Business size</u>	<u>Pilot</u>	
Provinces	1	
Total LMOs	7.5	
Retailers signed up		20
Units sold per year		400
 <u>Economics</u>		
Revenues	\$	7,920
Labor Costs (HQ)	\$	(11,875)
Labor/Ohd Costs (Prov Off)	\$	(10,000)
Labor Costs (LMO)	\$	(13,720)
** Promotion Costs	\$	(4,000)
Advertising Costs	\$	(12,500)
COGS + Transp.	\$	(6,080)
** Inventory Buildup	\$	(12,160)
Net Net	\$	(62,415)

** = Costs associated particularly with the pilot / launch phase.

13.5 Organization to support pilot project

The organizational structure for the pilot project should be a condensed version of the steady-state organizational structure detailed in Section 9.1.



13.6 *Schedule and key milestones for pilot*

(note: this is more detailed than in section 10)

PILOT	June 2003 – June 2004	<ul style="list-style-type: none"> • Make final decision on region for pilot project (Sichuan recommended) and initial prototype to test • Hire Country director for China. It will be KEY for the pilot manager and staff to reside in the country, near the target users. • Begin building marketing staff and partnerships with retailers. • Start a 12-month pilot program in which (1) the light is given to night market vendors in Sichuan for usability testing and (2) the light is sold to night market vendors in different regions on Sichuan to test demand, price sensitivity, and retailer partner relationships. For usability testing, LUTW should select various vendors to test the light and provide feedback on a regular basis. The LUTW China staff should travel to each vendor every month to receive feedback on the light and give a different prototype for the vendor to test. For actual sales, LUTW should also visit retailers who are selling the light on a monthly basis and should interview end users who have purchased the light to gain feedback on business model and prototype. • Prototype iteration based on user feedback. • Test all key assumptions, including whether night markets are best target and what distribution systems are best (complete list in Appendix). • Test different price points, to measure how price effects demand. • Develop training program for retailers that includes small scale repair, maintenance guidelines to pass on to consumers (such as do not use regular batteries in lights) • Final decision on light, target group, and distribution strategy. Roll-out to additional provinces.
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14 Appendices

14.1 Appendix 1 – User Experience

User Experience – This is the tool we used to gain empathy for our customers.

Before LED lighting:

Jetsun Kyempa is a market vendor residing in Western Sichuan province. His wife helps him tend the litchi orchard they own and goes to market with him occasionally. Their two children go to a village school two miles away from their home. During winter, they sometimes live there for convenience and safety's sake. He lives in a village of 4,000 people, large enough that the market is open daily, but he used to travel between smaller villages to sell shoes and millet, as each had a market on a different day of the week. In the summer, sells litchi fruit for supplemental income. He has run his own stall in the market since he was 16. Before this, he worked with his father, who also sold shoes. He earns an average income of around 197.2 yuan, or 24.65 US dollars per month, which takes care of necessities and keeps the business going, but by no means makes him rich.

Jetsun wakes up at 3:00am, when it is still dark. His wife is already up and has a bowl of rice porridge and pickled cucumber ready for him on the table. He washes quickly and prepares for the day. He turns on his electric light as he gathers his shoes to take to the market. He is glad that there is power today. It is unreliable, especially during the fall dry season when the hydropower can not be counted on. As soon as he steps outside, however, it is still pitch black. He uses a flashlight to guide his way down the uneven streets. He invested 5 yuan on the flashlight to replace his kerosene lantern a couple of years ago. The lamp was messy and spilled gas on his cart and shoes often left behind a nauseating odor, making them less attractive to potential customers. Also, the kerosene lamps gave off considerable smoke and light that is not bright enough to sell goods early in the morning and later in the evening. It was also a lot of work to transport the supply of kerosene every month from the seller's stand to his house. While the flashlight is more convenient in many ways, he has to buy batteries nearly every day. He wishes this was not such an expensive, yet necessary, part of doing business.

Jetsun walks slowly to the market, trying to balance the cart with one hand while holding the flashlight with the other. He arrives at 4:00AM and attempts to set up his stall with a flashlight in his mouth. He situates the aluminum poles he brought with him securely in the ground and surrounds them with tarp. He sets out the millet in large plastic bags on the tarp-covered ground. The stall three-sided with no roof or floor. Until 10 AM, he is busy selling millet. It is almost all gone by the time he stops for a lunch of noodles and spicy bean sauce, food he has brought with him from home. He chats with the other vendor owners and they exchange information about which markets to go to and who to get the cheapest supply from. What the best goods to sell is always a topic of interest.

He uses the tarp as a roof cover throughout the rest of the day, as Jetsun is occupied with selling new shoes and mending worn shoes brought to him for repairs, but business is extremely slow because many customers are at work.

At 4 PM, the night market starts getting set up. Some vendors have come with clothing, others with household goods such as detergent and soap. Hair supplies are also popular. Some customers coming home from work go to Jetsun's stall to pick up shoes they dropped off there yesterday. The cheap children's cloth shoes are also popular. His friend at the porridge stand gave him some dinner in exchange for some nails and tape. When it starts getting dark, he struggles to balance the flashlight as he mends shoes and wishes there was more light to show the craftsmanship and detail of his new shoes for sale.

The market stays lively until well past 9:00 pm - even until Midnight on warmer summer evenings. Villagers come to the market to look at goods and socialize. While there are many people interested in buying things late into the night and Jetsun would never close early. At 10:00pm, Jetsun packs up the shoes one more time and makes the trip home, cart balanced with one hand, flashlight held with the other.

After LED lighting:

Jetsun Kyempa wakes up at 3 AM to get ready to go to the market. He turns on the LED light from its charging stand instead of the electric light because it saves him money on the electric bill and

because he knows that the LED bulb will not burn out. Business has been going well so that he has been able to afford all through components of the Mod 3 LED light. He takes two of the LED lights from the stand from which it was charging before he steps out the door, leaving one for his wife to use to do household chores. He strings these lights to his cart and goes to the market. Once there, he strings them up on the aluminum poles. The unique shape and utility of the light brings many questions and attention, which has helped his business.

During lunch, he talks to this fellow tradesmen about how he finally decided to change to a different lighting source from flashlight. He tells them that although there was a considerable initial investment in the light, the money he will save on buying flashlights, batteries, and the electricity bill still made it an attractive option. In addition, he says that many people have come to his stand just to look at his lights and business has improved. A retailer came to his village to demonstrate how the light works and managed to give him a good deal on one light. As business improved, he says that he decided to buy a couple more lights to light his home as well. His friends seem intrigued by this new product and some are even considering to be retailers of the light. The retailer is close and they decide to stop by next time they pass his place.

Key Needs:

- More efficient light that saves money on purchasing fuel for kerosene or petroleum gas lamps
- More convenient light for multiple purposes for both the market and at home.
- Source of reliable light that is not dependent on the grid so he has more control over own living situation

14.2 Appendix 2 - Customer Economics

14.2.1 THREE HOURS OF LIGHT USE PER DAY

END USER ECONOMICS (figures in \$US)	Candle	Petroleum/ Kerosene	Flashlight	Market Vendor Rent Lit Space (25W bulb)	LUTW light 1 Luxeon
General Light Differences					
Lumens	1	4	40	313	25
Efficiency	0.01	0.05	11	8	25
Durability	M	M	H	L	H
USAGE & REPLACEMENT PATTERS					
Hours of Use/Day	3	3	3	3	3
Hours of Bulb, Wick, Lamp Life	3	1000	10,000	0	10,000
Hours of Fuel Life	n/a	100	8	3	1,000
Days to Bulb, Wick, Lamp replacement	1.0	333	3333	0	3333
Days to Fuel Replacement	n/a	33.3	3	1	333
Power Drain	n/a	n/a	1.2 hour	30 kWh	3.5 hours
LIGHT REPLACEMENT COSTS					
Fixed, "First Cost" of product	\$0.1	\$0.1	\$1.0	\$0.3	\$22.0
Bulbs, Wicks, Batteries	n/a	\$0.2	\$0.5	n/a	\$1.2
Fuel (per 1000 hrs)	n/a	\$4.5	n/a	n/a	n/a
days/year	350	350	350	350	350
Fixed costs / year	\$17.5	\$0.1	\$0.1	\$87.5	\$22.0
Operating Costs/year	n/a	\$48.8	\$65.6	n/a	\$1.3
TOTAL COSTS / YEAR	\$17.5	\$48.9	\$65.7	\$87.5	\$23.3

Assumptions

1. Candles last on average 3 hours
2. Kerosene/Gas wicks last for 1000 hours of use
3. Flashlight bodies last for 410,000 hours of use
4. LED lights and housing body will last for 10,000 hours of use
5. Kerosene is purchased in 100 hour increments (about 15 liters) that costs \$4.50 (at \$.30/liter)
6. Flashlight batteries (alkaline disposable) need to be replaced every 8 hours of continuous use and cost \$.50 for 2.
7. LEDs will have a small operating cost associated with yearly battery replacement any small repairs that must be done to solar panel, light, or battery replacement over time.

14.2.2 SIX HOURS OF LIGHT USE PER DAY

END USER ECONOMICS

(figures in \$US)

	Candle	Petroleum/ Kerosene	Flashlight	Market Vendor Rent Lit Space (25W bulb)	LUTW light 1 Luxeon
General Light Differences					
Lumens	1	4	40	313	25
Efficiency	0.01	0.05	11	8	25
Durability	M	M	H	L	H
USAGE & REPLACEMENT PATTERS					
Hours of Use/Day	6	6	6	6	6
Hours of Bulb, Wick, Lamp Life	3	1000	10,000	0	10,000
Hours of Fuel Life	n/a	100	8	3	1,000
Days to Bulb, Wick, Lamp replacement	0.5	167	1667	0	1667
Days to Fuel Replacement	n/a	16.7	1	1	167
Power Drain	n/a	n/a	1.2 hour	30 kWh	3.5 hours
LIGHT REPLACEMENT COSTS					
Fixed, "First Cost" of product	\$0.1	\$0.1	\$1.0	\$0.3	\$22.0
Bulbs, Wicks, Batteries	n/a	\$0.2	\$0.5	n/a	\$1.2
Fuel	n/a	\$4.5	n/a	n/a	n/a
(per 1000 hrs)					
days/year	350	350	350	350	350
Fixed costs / year	\$35.0	\$0.2	\$0.2	\$87.5	\$22.0
Operating Costs/year	n/a	\$97.7	\$131.3	n/a	\$2.5
TOTAL COSTS / YEAR	\$35.0	\$97.9	\$131.5	\$87.5	\$24.5

Assumptions

1. Candles last on average 3 hours
2. Kerosene/Gas wicks last for 1000 hours of use
3. Flashlight bodies last for 410,000 hours of use
4. LED lights and housing body will last for 10,000 hours of use
5. Kerosene is purchased in 100 hour increments (about 15 liters) that costs \$4.50 (at \$.30/liter)
6. Flashlight batteries (alkaline disposable) need to be replaced every 8 hours of continuous use and cost \$.50 for 2.
7. LEDs will have a small operating cost associated with yearly battery replacement any small repairs that must be done to solar panel, light, or battery replacement over time.

14.3 Appendix 3 - Key assumptions in the financial model

In terms of the model, here are the key assumptions that drive the calculations and predictions:

CHINA - Single User - Night Market Trader	
Appendix of key model assumptions	

Source: Model Vers 8

Assumptions				
Primary	Secondary		Quai	Dollar/N
		Unit of Analysis = Market Trader (Customer)		
A1		Lamp, Battery, Panel purchase per customer		1
A2		Lamp price to Market Trader (end customer)	176 \$	22.00
A3		Price for repair of light	0 \$	-
A4		Monthly Expenditure for Lighting Now	25 \$	3.13
		Unit of Analysis = Local Retailer		
A5		Number of Market Traders Served / yr		32
A6		Cost Per Lamp to Local Retailer	158.4	19.8
A7		Ave time Retailer holds the product	months	3
		Unit of Analysis = Local Marketing Officer		
A8		"Sales". Number of Retailers visited / week		4
A9a		"Sales". Number of weeks/yr on the road		40
A9b		"Sales". Success rate per visit		12%
A10		% Additional sales sold direct (ie w/o retail)		10%
A11a		Monthly Salary (base salary)	400 \$	50.00
A11b		Commission Salary (per unit sold thru retailer)	11 \$	1.38
A11c		Commission Salary (per unit sold direct)	11 \$	1.38
A12		Monthly Travel & Communication	200 \$	25.00
		Unit of Analysis = Provincial Office		
A13		Number of Marketing Officers		15
A14		Annual Advertising Costs	20000 \$	2,500.00
A15		Number of Administrators (in Prov Office)		4
A16		Monthly Salary	1500 \$	187.50
A17		Space (annual)	5000 \$	625.00
		Unit of Analysis = LUTW China		
A18		Number of Provincial Offices		6
A19		Mfg/Purchase Cost Per Lamp System	104 \$	13.00
A20		Transport Cost Per Lamp System	17.6 \$	2.20
A21		One Film (Advertising)	160,000 \$	20,000.00
A22		No of Administrators		15
A23		Monthly Salary of Administrators	2,500 \$	312.50
A24		Cost of Space (annual)	15,000 \$	1,875.00
A25		Communications (annual)	10,000 \$	1,250.00

14.4 Appendix 4 - Map of China

The map below shows a map of China, and the 6 provinces that we recommend entering first.



14.5 Appendix: Sources and Endnotes

ⁱ World Bank Report

ⁱⁱ "Local Governments Overcharge for Power in Rural Areas" – Source: People's Daily 8/17/98

Full article below:

According to regulations which cover all of China except for Inner Mongolia, Hainan, and Guangdong for China's provinces averages 0.34 RMB per kilowatt-hour (USD 0.06), to which allowed fees are added to come to under 0.39. Several provinces have set electric power rates plus surcharges of RMB 0.44. Yet in fact electric power prices in China are chaotic: each province is different and even each county along the same power line is different! Higher electric power prices trouble production. In non-ferrous metal production, for example, electric power accounts for 40 percent of production costs. **Many farmers are very unhappy about electric power surcharges since in some rural areas the cost of electric power exceeds RMB 1.0. Some farmers are even abandoning electricity and going back to kerosene lamps or candles.** A study of illegal added charges to electricity bills in China turned up RMB 21.7 billion in illegal electric fees collected on the pretext of 528 different types of electricity surcharges. Here is what the survey found in its study of electric power pricing:

- * The State power network RMB 0.38
- * Interprovincial power networks RMB 0.425
- * Regional and urban power networks RMB 0.43
- * County power networks RMB 0.47
- * Rural power networks RMB 0.67

Authoritative sources say that this is just the tip of the iceberg. Many local governments add much more -- especially county governments and local governments which provide power to governments. Another survey conducted January - June 1997 (excluding Shandong and Inner Mongolia) turned up RMB 6.62 billion in unauthorized surcharges on provincial power networks, RMB 1.7 billion on urban and regional for a total of RMB 10.5 billion over a six month period. Illegal fees included electric power poverty alleviation fees, electric power family planning fees, and electric power water conservancy fees. The manager of an aluminum plant complained about local government adding many illegal fees to the electric power bill. Yet State Council documents clearly state that electric power price changes must be approved by the State Council and that adding supplementary fees is not allowed. The State Council decided that the central government will stamp out illegal electric power fees and so the State Development Planning Commission, the former Ministry of Electric Power, and the Central Disciplinary Commission and the State Council Office on Reducing Burdens [Jianfu ban] issued the order.

ⁱⁱⁱ China Business World, <http://www.cbw.com/index.html>

^{iv} China Statistical Yearbook -2001

^v China Statistical Yearbook -2001

^{vi} China Statistical Yearbook -2001

^{vii} *Report from the U.S. Embassy in Beijing, December 2002*, <http://www.usembassy-china.org.cn/sandt/ptr/Electrification-prt.htm>

^{viii} United Nations Population Fund (UNFPA), <http://www.unescap.org/pop/database/chinadata/intro.htm>

Table: CARS

Example of a relatively expensive, individual-focused consumer good replacing lower cost, ubiquitous bicycles.

%Change	1999	2000	2001	Apr 2002-Nov 2002
Urban	7.1%	10.6%	11.5%	71.4%
Rural	5.7%	8.3%	8.7%	49.8%
TOTAL	6.8%	9.7%	10.1%	71.1%

Source: Economist Country Report, China

^{ix} Anthony , Rengzhou, Sichuan, China

^x Conversation with Ralph Flory, June 2003.

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The End.