

# LED Bulbs : Customer's Perspective

(Case of Moradabad City)

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## ABSTRACT

An LED lamp or LED light bulb is an electric light for use in light fixtures that produces light using one or more light-emitting diodes (LEDs). LED lamps have a lifespan many times longer than equivalent incandescent lamps, and are significantly more efficient than most fluorescent lamps, with some LED chips able to emit up to 303 lumens per watt. The Indian lighting industry is evolving rapidly due to the shift from conventional bulbs to LEDs, which is being driven by increasing government energy conservation initiatives, rising consumer awareness about energy-efficient products and innovative product offerings in sync with the mega trend of digitization. This evolution indicates a tectonic shift in technology from electrical to electronics, representing significant growth opportunities for companies offering the electronic hardware/components, products and solutions used in LED lighting. It has become very important to know what the consumer wants with reference to these LED bulbs, hence the researcher has done a survey to study the consumer response in Moradabad city towards the LED bulb usage. Data has been collected through questionnaire method and collected data has been analyzed using statistical tools like Mean, Standard Deviation and Chi square Methods. The findings are very much resonating with the researchers objectives and has prove that LED market is very much accepted by the consumers, further study on bigger population is planned to get much better picture .

Key Words : LED, Bulbs, Lighting Industry.

## INTRODUCTION

### LED Lamps

An LED lamp or LED light bulb is an electric light for use in light fixtures that produces light using one or more light-emitting diodes (LEDs). LED lamps have a lifespan many times longer than equivalent incandescent lamps, and are significantly more efficient than most fluorescent lamps, with some LED chips able to emit up to 303 lumens per watt. However, LED lamps require an electronic LED driver circuit when operated from mains power lines, and losses from this circuit mean the efficiency of the lamp is lower than the efficiency of the LED chips it uses. The LED lamp market is projected to grow by more than twelve-fold over the next decade, from \$2 billion in the beginning of 2014 to \$25 billion in 2023, a compound annual growth rate (CAGR) of 25%.

Similar to incandescent lamps (and unlike most fluorescent lamps), LEDs come to full brightness immediately with no warm-up delay. Frequent switching on and off does not reduce life expectancy as with fluorescent lighting Light output decreases gradually over the lifetime of the LED.

### LED Market in India

The Indian lighting industry is evolving rapidly due to the shift from conventional bulbs to LEDs, which is being driven by increasing government energy conservation initiatives, rising consumer awareness about energy-efficient products and innovative product offerings in sync with the mega trend of digitization. This evolution indicates a tectonic shift in technology from electrical to electronics, representing significant growth opportunities for companies offering the electronic hardware/components, products and solutions used in LED lighting. There are also opportunities for prototype designers, electronics manufacturing services (EMS)

providers and original equipment manufacturers (OEMs). In this report, we try to provide insights into India's LED lighting ecosystem, focusing primarily on market size, opportunities, the major demand-generating applications, and hindrances that impact growth and emerging technology trends.

## Market size

India is the second most populous country in the world and yet, is only the fifth largest electricity consumer – a situation that has led to an ever-widening demand-supply gap. Consequently, the market for energy-efficient products such as LED lighting is bound to grow, riding on the initiatives that encourage the use of LED lights, the focus on smart city projects, an efficient public distribution system and the ever increasing need for a smart, connected lifestyle. According to report from the Electric Lamp and Component Manufacturers Association (ELCOMA), the Indian LED market is expected to grow to Rs 261 billion by 2020, which is approximately 80 per cent of the total lighting industry. According to a report from TechSci (a global research-based consulting firm), the LED lighting market in India is projected to register a CAGR of over 24 per cent during 2016-2021. The Indian LED lighting market stood at US\$ 918.70 million in 2016, and is projected to grow at a CAGR of 24.66 per cent, in value terms, to reach US\$ 3.76 billion by 2022, on account of increasing government initiatives to boost LED adoption and growing awareness regarding lower power consumption of LED lighting products. Moreover, easy availability at low prices, coupled with the distribution of LED bulbs by the Indian government at affordable rates is augmenting demand.

The key factors that are expected to boost the market include declining LED prices coupled with favourable government initiatives that provide LED lights at a subsidised cost and promote LED street lighting projects through a special energy services company (ESCO) model created by EESL. Moreover, apart from rising consumer awareness about the cost-effectiveness of LEDs, their enhanced life, energy-efficiency and eco-friendly nature will continue to drive volume sales from the industrial, residential and commercial sectors.

## Market opportunities

LEDs are versatile products and can be used for residential lighting, street lighting, down lights, landscaping, monument lighting, signage, traffic signals, security lights, industrial lighting, office space lighting, automotive lighting and much more. Low energy consumption, low costs, modular designs and ease of use have made LED lighting the first choice in industrial, commercial and domestic applications.

The major demand-generating application areas are:

1. Street lighting
2. Residential lighting
3. Office space lighting
4. Industrial lighting

The demand for streetlights is being driven by government initiatives. Demand for LED lighting products used in residential and office spaces is mainly driven by increasing consumer awareness about energy-efficient products with more functionality. Increasing demand for LEDs for industrial areas including warehouses, manufacturing floors, etc, is a new trend. In the hazardous work areas across industries, too, most of the new lighting requirements are for LEDs.

The demand for LED lighting in India is still mostly driven by metro cities due to awareness and socio-economic growth. However, the demand from Tier-II cities is expected to grow too, on account of the potential applications for street lighting and industrial lighting. The demand for LED lighting from rural India is also going to increase significantly, soon, due to the government initiatives for implementing rural LED street lighting projects by retrofitting conventional streetlights with LED lights in gram panchayats under the Street Lighting National Project (SLNP). Further expansion of such initiatives across the country will open up new market areas for the LED lighting industry.

## RESEARCH METHODOLOGY AND DATA ANALYSIS

### Objectives of the Research

1. To study customer reaction towards Availability of LED Bulbs in Moradabad City
2. To study customer reaction towards Brightness of LED Bulbs in Moradabad City
3. To study customer reaction towards Power efficiency of LED Bulbs in Moradabad City
4. To study customer reaction towards Price of LED Bulbs in Moradabad City

### Hypothesis

Researcher has developed following hypothesis:

H<sub>01</sub> : The average customer response towards Availability of LED bulbs states that LED bulbs are not easily available in their locations.

H<sub>1</sub> : The average customer response towards Availability of LED bulbs states that LED bulbs are easily available in their locations.

H<sub>02</sub> : The average customer response towards Brightness of LED bulbs states that LED bulbs have less brightness.

H<sub>2</sub> : The average customer response towards Brightness of LED bulbs states that LED bulbs have more brightness.

H<sub>03</sub> : The average customer response towards Power Efficiency of LED bulbs states that LED bulbs are not power efficient.

H<sub>3</sub> : The average customer response towards Power Efficiency of LED bulbs states that LED bulbs are highly power efficient.

H<sub>04</sub> : The average customer response towards Price of LED bulbs states that LED bulbs are very costly.

H<sub>4</sub> : The average customer response towards Price of LED bulbs states that LED bulbs are very much affordable.

### Sampling

Researcher has used simple random sampling to take sample of 200 residents of Moradabad who use LED bulbs in their homes.

### Testing of Hypothesis

#### Hypothesis 1

H<sub>01</sub> : The average customer response towards Availability of LED bulbs states that LED bulbs are not easily available in their locations.

H<sub>1</sub> : The average customer response towards Availability of LED bulbs states that LED bulbs are easily available in their locations.

Respondents were asked to give response regarding the Availability of LED bulbs in their locality and were asked to provide responses from 1 to 5, where 1 represents least availability and 5 representing abundant availability. Following was their response:

Response	1 (Least availability)	2	3	4	5 (Abundant Availability)
Availability of LED Bulb	30	24	37	46	63

Majority of respondents have chosen option 5 which represents Abundant Availability of LED in their locality

Mean	3.44
SD	1.423563
Chi Square	23.3

\*critical value of chi Square at 5 df is 11.07

As we can see Chi Square value is way above the Critical value hence we shall reject null hypothesis and accept alternate hypothesis i.e. the average customer response towards Availability of LED bulbs states that LED bulbs are easily available in their locations.

### Hypothesis 2

H<sub>02</sub> : The average customer response towards Brightness of LED bulbs states that LED bulbs have less brightness.

H<sub>2</sub> : The average customer response towards Brightness of LED bulbs states that LED bulbs have more brightness.

Respondents were asked to give response regarding the Brightness of LED bulbs they are using and were asked to provide responses from 1 to 5, where 1 represents least Brightness and 5 representing abundant Brightness. Following was their response:

Response	1 (Least Brightness)	2	3	4	5 (Abundant Brightness)
Brightness of LED Bulb	30	28	34	55	53

Majority of respondents have chosen option 4 which represents Good Brightness of LED bulbs they are using.

Mean	3.365
SD	1.396973
Chi Square	16.9

\*critical value of chi Square at 5 df is 11.07

As we can see Chi Square value is way above the Critical value hence we shall reject null hypothesis and accept alternate hypothesis i.e. The average customer response towards Brightness of LED bulbs states that LED bulbs have more brightness.

### Hypothesis 3

H<sub>03</sub> : The average customer response towards Power Efficiency of LED bulbs states that LED bulbs are not power efficient.

$H_3$  : The average customer response towards Power Efficiency of LED bulbs states that LED bulbs are highly power efficient.

Respondents were asked to give response regarding the Power Efficiency of LED bulbs they are using and were asked to provide responses from 1 to 5, where 1 represents least efficient and 5 representing most efficient. Following was their response:

Response	1 (Least Efficient)	2	3	4	5 (Most Efficient)
Power Efficiency of LED Bulb	24	35	43	50	48

Majority of respondents have chosen option 4 which represents Good Power Efficiency of LED bulbs they are using.

Mean	3.27
SD	1.351381
Chi Square	11.4

\*critical value of chi Square at 5 df is 11.07

As we can see Chi Square value is way above the Critical value hence we shall reject null hypothesis and accept alternate hypothesis i.e. The average customer response towards Power Efficiency of LED bulbs states that LED bulbs are highly power efficient.

#### **Hypothesis 4**

$H_{04}$  : The average customer response towards Price of LED bulbs states that LED bulbs are very costly.

$H_4$  : The average customer response towards Price of LED bulbs states that LED bulbs are very much affordable

Respondents were asked to give response regarding the Price of LED bulbs they are using and were asked to provide responses from 1 to 5, where 1 represents Most Costly and 5 representing least Costly. Following was their response:

Response	1 (Most Costly)	2	3	4	5 (Least Costly)
Price of LED Bulb	27	31	52	55	35

Majority of respondents have chosen option 4 which represents Less Costly of LED bulbs they are using.

Mean	3.2
SD	1.279918
Chi Square	16.1

\*critical value of chi Square at 5 df is 11.07



As we can see Chi Square value is way above the Critical value hence we shall reject null hypothesis and accept alternate hypothesis i.e. The average customer response towards Price of LED bulbs states that LED bulbs are very much affordable.

### CONCLUSION

The study clearly shows that responses from the LED users have very positive answers in favor of using LEDs. As the four major aspects related to LED sales i.e. availability, Brightness, Power efficiency and Price, all have scored high in this study. It is very much evident that the current users are very much satisfied with the use of LED bulbs in and around their homes. This also makes a great opportunity for the researcher to further proceed with the same study with much wider population in order to get much wider response and more accurate results.

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