

Consumer Perception and Purchasing Behavior towards LED Lights.

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Abstract

LED stands for Light Emitting Diode. In the search for energy-efficient lighting, LEDs have proven to be the eco-friendly and the most efficient bulbs available.

Consumer buying behavior is the sum total of a consumer's attitudes, preferences, intentions, and decisions regarding the consumer's behavior in the marketplace when purchasing a product or service. This study provides evidence of awareness of LED lights among consumers. It highlights the need and benefits of using LED (green) Lights thereby contributing to the environment as taking care of the environment is the responsibility that everyone should feel accountable for.

The study also highlights about the leading LED Lighting company in India., i.e. Philips. The insights from data collected can help in developing effective marketing strategies to promote the usage of LED lights.

Keywords: Light Emitting Diode, Green Lighting, efficiency, consumer awareness and perception.

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I. Introduction

Consumer buying behaviour is the sum total of a consumer's attitudes, preferences, intentions, and decisions regarding the consumer's behaviour in the marketplace when purchasing a product or service. The study of consumer behaviour draws upon social science disciplines of anthropology, psychology, sociology, and economics. Consumer behaviour emerged in the 1940s and 50s as a distinct sub-discipline in the marketing area.

It examines how emotions, attitudes and preferences affect buying behaviour. Characteristics of individual consumers such as demographics, personality lifestyles and behavioral variables such as usage rates, usage occasion, loyalty, brand advocacy, willingness to provide referrals, in an attempt to understand people's wants and consumption are all investigated in formal studies of consumer behavior. The study of consumer behaviour also investigates the influences, on the consumer, from groups such as family, friends, sports, reference groups, and society in general.

The study of consumer behaviour is concerned with all aspects of purchasing behaviour—from pre-purchase activities through to post-purchase consumption, evaluation and disposal activities. It is also concerned with all persons involved, either directly or indirectly, in purchasing decisions and consumption activities including brand influencers and opinion leaders.

consumption on the environment due to the use of making processes, components and recycling techniques which are less harmful for

Therefore firms are taking action to develop potential ecological approaches in the green market industry. Green marketing and green product development are useful techniques that are used by firms to increase competitive advantages and stand a chance of gaining the satisfaction of consumers.

One such green product is LED Lights. LED bulbs are considered as a green product since they save significant amount of energy and carbon emissions over incandescent and fluorescent lamps. LED bulbs are available in various sizes in markets.

RESEARCH PROBLEM

purchase intention towards green products. Through this research, it is proposed that a detailed study and analysis will be done with respect to the advantages of LED lights for the environment. An overall impact of green products (particularly Philips LED Lights) on the environment will also be studied.

Need/Significance of the study

Recent years have seen surge in the consumption and production of green products in India. An important component of this growing market sector.

LED lights and its contribution towards the environment.

The Overall Impact /Advantages of LED Lights for the Environment:

Taking care of the environment is a responsibility that everyone should feel accountable for. Most of us are already aware of environmentally friendly processes such as recycling to minimize the amount of waste we produce and reduce our carbon footprint. However, a lot of people are unaware of new and upcoming technologies that we can use to help reduce carbon emissions. A good example of this is LED lighting, which provides many environmental advantages. By far the most energy efficient, the cleanest and most eco-friendly way of illumination is LED lighting, which is basically digital light and comes with a multitude of amazing benefits.

1. Energy Efficient

LED lights are up to 80% more efficient than traditional lighting such as fluorescent and incandescent lights. 95% of the energy in LEDs is converted into light and only 5% is wasted as heat. This is compared to fluorescent lights which convert 95% of energy to heat and only 5% into light! LED lights also draw much less power than traditional lighting; a typical 84 watt fluorescent can be replaced by a 36 watt LED to give the same level of light. Less energy use reduces the demand from power plants and decreases greenhouse gas emissions.

2. No Toxic Elements

LED lights contain no toxic elements. Most offices currently use fluorescent strip lights which contain noxious chemicals such as mercury. This will contaminate the environment when disposed of in landfill waste. Disposal has to be arranged through a registered waste carrier so switching to LED avoids the cost and time implications required for compliant disposal - and helps to protect the environment from further toxic Waste.

3. Less Lights Needed

LEDs have a better quality of light distribution and focus light in one direction as opposed to other types of lighting which waste energy by emitting light in all directions, often illuminating areas where light isn't required (such as the ceiling).

This means that less LED lights are needed to achieve the same level of brightness given off by fluorescent and incandescent lights. Fewer lights will reduce energy consumption and will therefore be a benefit to the environment.

4. Life span

A longer life span means lower carbon emissions. LED Lights last up to six times longer than other types of lights, reducing the requirement for frequent replacements. This results in using fewer lights and hence fewer resources are needed for manufacturing processes, packaging materials and transportation.

5. Ecologically Friendly- LED Lighting Is Much More Eco-Friendly

LED lights are free of toxic chemicals. Most conventional fluorescent lighting bulbs contain a multitude of materials like e.g. mercury that are dangerous for the environment. LED lights contain no toxic materials and are 100% recyclable, and will help you to reduce your carbon footprint by up to a third. The long operational life time span mentioned above means also that one LED light bulb can save material and production of 25 incandescent light bulbs. A big step towards a greener future!

6. Durable Quality - LED Illumination Can Withstand Rough Conditions

LEDs are extremely durable and built with sturdy components that are highly rugged and can withstand even the roughest conditions. Because LED lights are resistant to shock, vibrations and external impacts, they make great outdoor lighting systems for rough conditions and exposure to weather, wind, rain or even external vandalism, traffic related public exposure and construction or manufacturing.

Objectives of the study

- To analyse consumer awareness and perception towards LED lights
- To identify the factors and features by which a consumer gets influenced.

Research Methodology

A) Hypothesis of the study:

- To test the association between the price range of LED lights and the no. of hours the lights are switched on.

B) Statistical tools used to analyse the data :-

Collected data is analysed by calculating simple percentages.

Tabular Representation, Bar Graphs, Column Graphs and Pie charts are used to depict the data, at appropriate places and Chi-square tests is used to analyse the data.

C) Sources of data : The study is based on both primary and secondary data.

1) Primary data is the information that is collected specifically for the purpose of research project and it was collected by distributing the questionnaires.

2) Secondary data refers to the data collected by someone else than the user and was collected from books, journals and the internet.

D) Sample size, nature of the sample unit and sampling procedure :-

The sample size is 70 respondents.

The study involved consumers of all age groups i.e adults as well as teenagers and is descriptive in nature. The sample consists of people who give preference to the purchase of LED lights. The sampling procedure used is purposive sampling under non-probability sampling.

Scope of the study

This section specifies the limit/confines in terms of geography, time and the theoretical concepts studied during the course of research.

Limitations of the study

1. The main limitation of the project is that it is limited to a sample of 70 respondents which is very small and may not reflect a broader picture.
2. It is confined only to a particular product of Philips i.e LED lights.

Chapterisation

Chapter 1: Introduction

This chapter includes the basic outline of the project. It covers the most fundamental aspects of a research work like literature review, objectives, scope, importance, limitations and research methodology used for the project.

Chapter 2 : Review of Literature

Chapter 3: Company Profile

This chapter includes all the secondary data collected from various sources. It gives a deeper understanding of consumer buying behaviour. It also includes details about the current scenario and growth potential of products in the Indian market. It studies about Philips being one of the leading LED Light companies in India.

Chapter 4: Data Analysis and Interpretation

This chapter covers the analysis and interpretation of data collected from 70 respondents by administering questionnaire. It contains an analysis of each question by calculating simple percentages in a tabular form, pie charts, bar graphs, column graphs and cross tabulation for analysing questions in the form of chi square tests.

Chapter 5: Findings and Suggestions

This chapter covers the findings of the study for each objective, the conclusion and suggestion.

II. Data Analysis & Interpretation

1. AGE

| Age | No.Of Respondants | Percentage |
|----------------|-------------------|------------|
| Below 20 Years | 23 | 32.9 % |
| 20-30 Years | 38 | 54.3% |
| 30-40 Years | 5 | 7.1% |
| Above 40 Years | 4 | 5.7% |
| Total | 70 | 100% |

Table 2.1

Source : Questionnaire

INTERPRETATION

From the above table, it can be inferred that 54.3 % of the respondents are between 20-30 years, 32.9% are below 20 years, 7.1% are between 30-40 years and 5.7% of the respondents belong to the age category of 40 years and above. Majority of the respondents belong to the age group of 20-30 years.

2.2 GENDER

| Gender | No.Of Respondants | Percentage |
|--------|-------------------|------------|
| Male | 30 | 42.86% |
| Female | 40 | 57.14% |
| Others | 0 | 0% |
| Total | 70 | 100% |

TABLE 2.2

Source : Questionnaire

INTERPRETATION

The above 70 people have given their opinion on the LED Lights and have been the respondents of the survey. From the above table, it is observed that 57.14 % of the total respondents surveyed were females and 42.86 % of the respondents were males. Here the female gender is beating the male gender by just a small margin.

2.3 OCCUPATION OF THE RESPONDENTS

| Occupation | No.OfRespondants | Percentage |
|---------------|------------------|------------|
| Student | 49 | 70.00% |
| Self-employed | 10 | 14.29% |
| Home-maker | 4 | 5.71% |
| Employee | 7 | 10% |
| Total | 70 | 100 |

TABLE 2.2

Source : Questionnaire

INTERPRETATION:

From the above table, it is observed that 70% respondents are students,14.29% are self employed, 10% are employees and 5.71 % of the respondents are home makers.

2.4 AWARENESS ABOUT LED LIGHTS

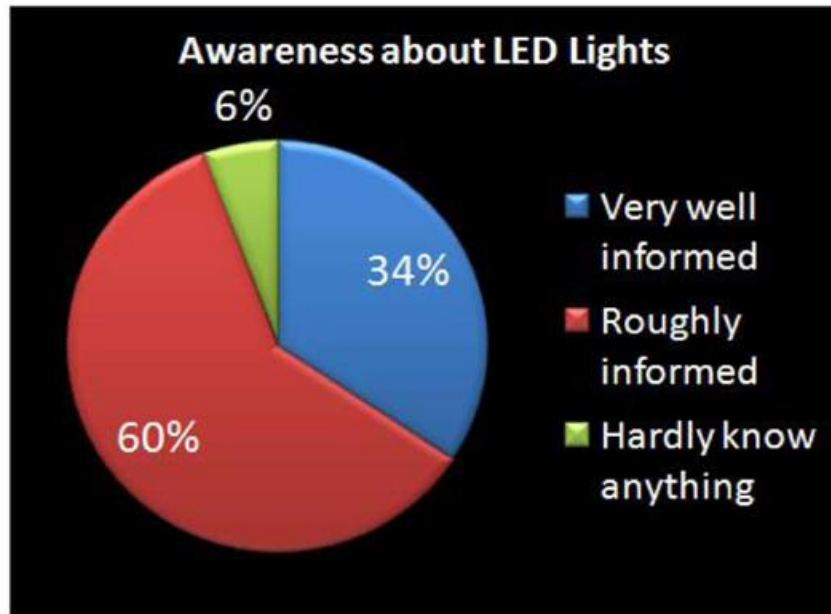


Fig 2.4

Source : Questionnaire

INTERPRETATION

From the above chart, it can be inferred that 60% of the respondents are roughly informed about LED lights, 34.29% are very well informed, and 5.71% of the respondents hardly know anything about LED lights.

2.5 SOURCE OF AWARENESS

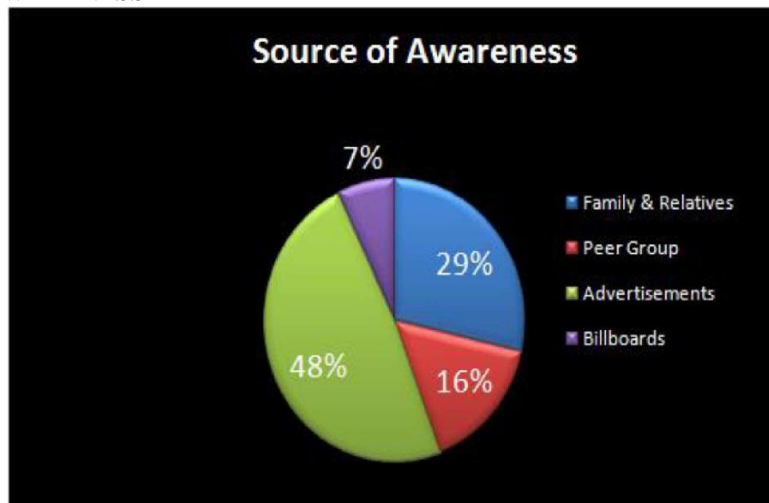


Fig. 2.5

Source : Questionnaire

INTERPRETATION

From the above chart, it can be inferred that 48.57% of the respondents know about LED lights through advertisements, 28.57% from family and relatives, 15.72% through peer group, and 7.14% of the respondents from Billboards.

2.6 ATTRIBUTES CONSIDERED WHILE MAKING A PURCHASE DECISION (multiple select)

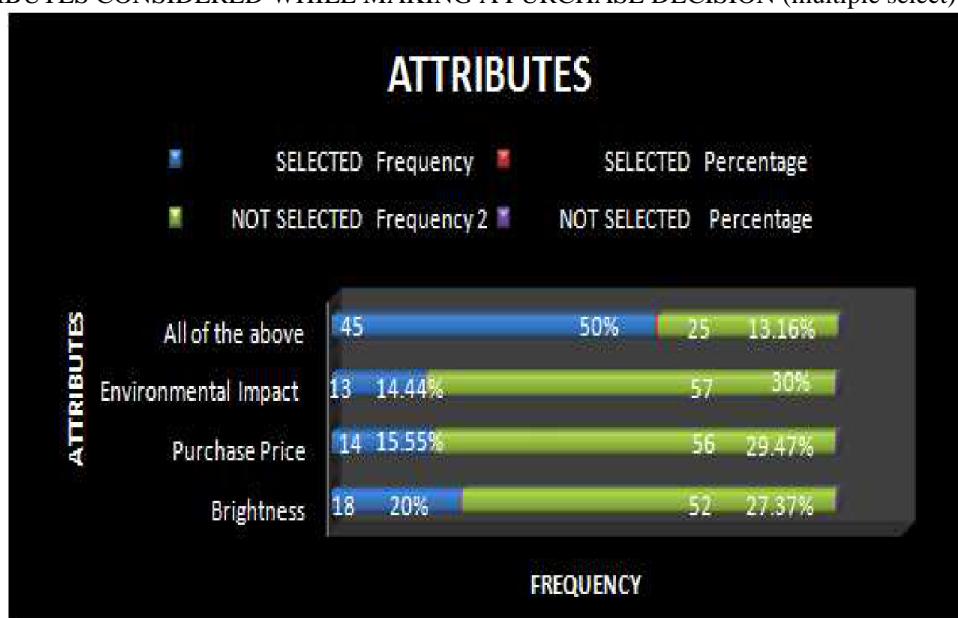


Fig 2.6

Source : Questionnaire

INTERPRETATION

From the above chart, it is observed that 50% of the respondents consider all of the attributes while purchasing LED lights, 20% consider brightness, 15.55% consider purchase price and 14.44% consider environmental impact.

It can also be observed that 13.16% of the respondents do not consider all of the above attributes while purchasing LED lights, 30% do not consider environmental impact, 29.47% do not consider purchase price and 27.37% do not consider brightness.

2.7. IMPORTANCE OF CRITERIA FOR PURCHASE DECISION (Rate the following on a scale of 1-5 (1 being the least important and 5 being the most important))

| CRITERIA | RATE 1 | | RATE 2 | | RATE 3 | | RATE 4 | | RATE 5 | | TOTAL NoR | TOTAL % |
|------------------------|--------|------|--------|------|--------|-------|--------|-------|--------|-------|-----------|---------|
| | NoR | % | NoR | % | NoR | % | NoR | % | NoR | % | | |
| Light Bulb durability | 2 | 2.85 | 5 | 7.14 | 17 | 24.3 | 19 | 27.14 | 27 | 38.57 | 70 | 100 |
| Low energy consumption | 3 | 4.3 | 6 | 8.57 | 11 | 15.71 | 23 | 32.85 | 27 | 38.57 | 70 | 100 |
| Brightness | 3 | 4.3 | 7 | 10 | 16 | 22.85 | 27 | 38.57 | 17 | 24.28 | 70 | 100 |

Table 2.7 Source : Questionnaire

INTERPRETATION :

From the above table , it is observed that:

● 27.14% of the respondents consider health impact to be the most important criteria for purchase decision of LED lights, 27.14% consider it to be equally important to other factors, 24.3% consider it to be more important, 15.71% consider it to be less important and 5.71% consider it to be the least important.

● 38.57% of the respondents consider light bulb durability to be the most important criteria for purchase decision of LED lights, 27.14 % consider it to be more important, 24.3% consider it to be equally important, 7.14% consider it to be less important and 2.85% consider it to be the least important factor.

● 38.57% of the respondents consider low energy consumption to be the most important criteria for purchase decision of LED lights, 32.85% consider it to be more important, 15.71% consider it to be equally important, 8.57% consider it to be less important and 4.3% consider it to be the least important factor.

● 38.57% of the respondents consider brightness to be the more important criteria for purchase decision of LED lights, 24.28% consider it to be the most important, 22.85% consider it to be equally important, 10% consider it to be less important and 4.3% consider it to be the least important factor.

2.8 USAGE PERCENTAGE OF LED LIGHTS AT HOME

| Usage Percentage | No.OfRespondants |
|------------------|------------------|
| 25% | 17 |
| 50% | 18 |
| 75% | 24 |
| 100% | 11 |
| Total | 70 |

Table 2.7

Source : Questionnaire

INTERPRETATION

From the above table, it is observed that 34.29% of the respondents use 75% of LED lights, 24.29 % use 25% of LED lights at their home, and 15.71% of the respondents use 100% of LED lights at their home.

2.9 EVALUATION OF LIGHTING OPTIONS

| Options | No.OfRespondants | Percentage |
|-----------|------------------|------------|
| Yes | 32 | 45.70% |
| No | 11 | 15.70% |
| Sometimes | 27 | 38.60% |
| Total | 70 | 100 |

Table 2.9

Source : Questionnaire

INTERPRETATION

From the above table , it is observed that 45.70% of the respondents evaluate the various lighting options, 38.60% of the respondents evaluate the lighting options sometimes and 15.70% do not evaluate the various lighting options.

2.10 CHANGE TO EFFICIENT LIGHT BULBS

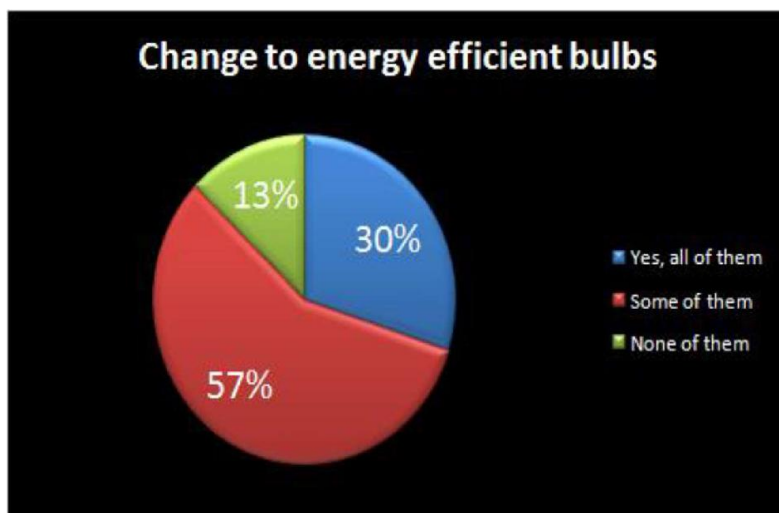


Fig.2.10

Source : Questionnaire

INTERPRETATION:

From the above chart, it can be observed that 57.14 % of the respondents have changed some of the bulbs at home to energy efficient ones, 30% of the respondents have changed all of them, and 12.86 % of the respondents haven't changed any of them.

2.11 DURATION OF KEEPING THE LIGHTS ON

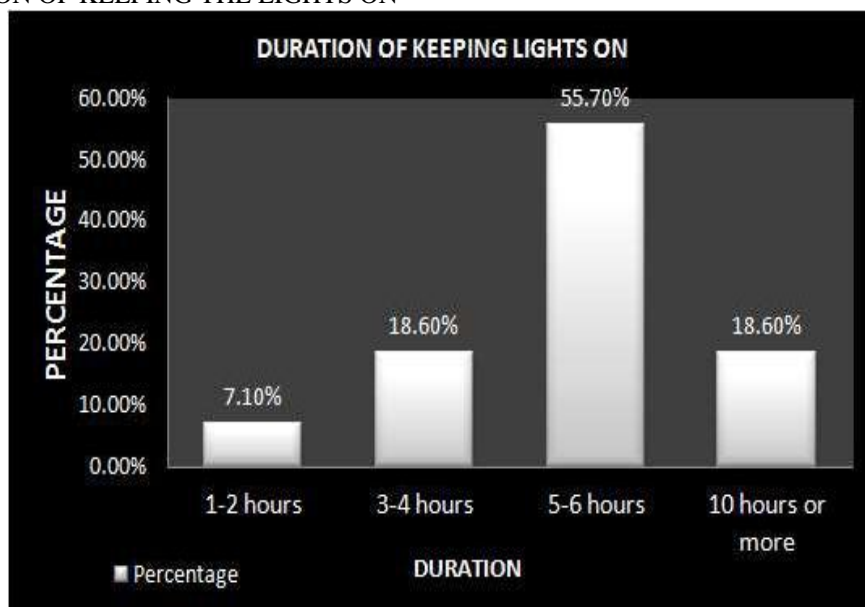


Fig.2.11

Source : Questionnaire

INTERPRETATION:

From the above chart, it can be inferred that 55.70% of the respondents keep the lights on for 5 to 6 hours, 18.60% for 3 to 4 hours, 18.60% for 10 hours or more and 7.10 % of the respondents keep the lights on for 1-2 hours.

2.12 PERFORMANCE OF LED LIGHTS

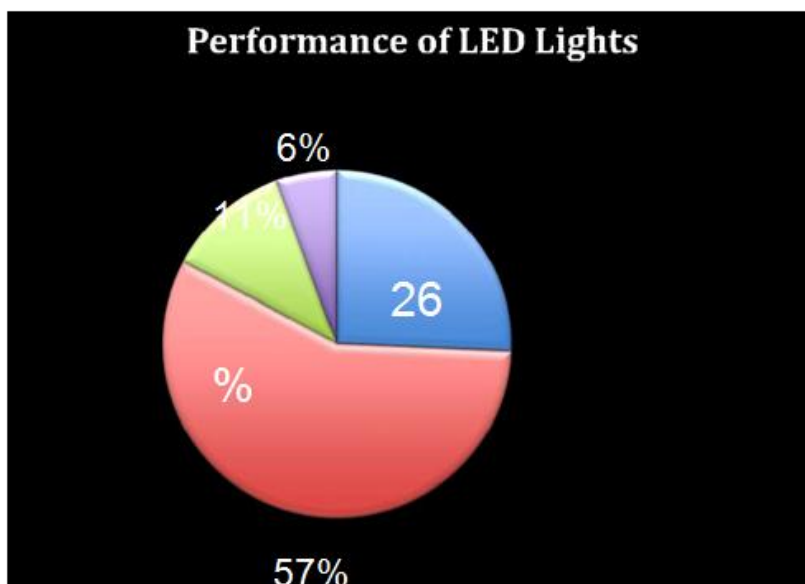


Fig.2.12

Source : Questionnaire

INTERPRETATION:

From the above chart, it can be inferred that 57.14 % of the respondents say that the product line of LED lights is good, 25.71% say that it is excellent, 11.43% say that it is average and 5.72 % of the respondents says that the product line of LED lights is poor.

2.13 PURCHASE INTENTION OF CUSTOMERS AGAINST THE PRICE RISE

| Options | No.OfRespondants | Percentage |
|-----------------------|------------------|------------|
| Increase of Rs. 30/- | 42 | 60.00% |
| Increase of Rs. 50/- | 20 | 28.57% |
| Increase of Rs. 100/- | 8 | 11.43% |
| Total | 70 | 100 |

Table 2. 13

Source : Questionnaire

INTERPRETATION:

From the above table, it can be observed that 60% of the respondents would prefer purchasing LED lights upto an increase of Rs. 30, 28.57 % would prefer purchasing upto an increase of Rs. 50 and 11.43% would prefer purchasing LED lights for an increase of Rs. 100 and above.

2.14 PRICE RANGE OF LED LIGHTS



Fig. 2.14

Source : Questionnaire

INTERPRETATION:

From the above chart, it can be observed that 47.14 % of the respondents say that the price of LED lights are moderate, 37.14% say that the prices are high, 10 % say that the prices are very high and 5.72% percent say that the prices of LED lights are low.

2.15 CHANGE IN PRICING

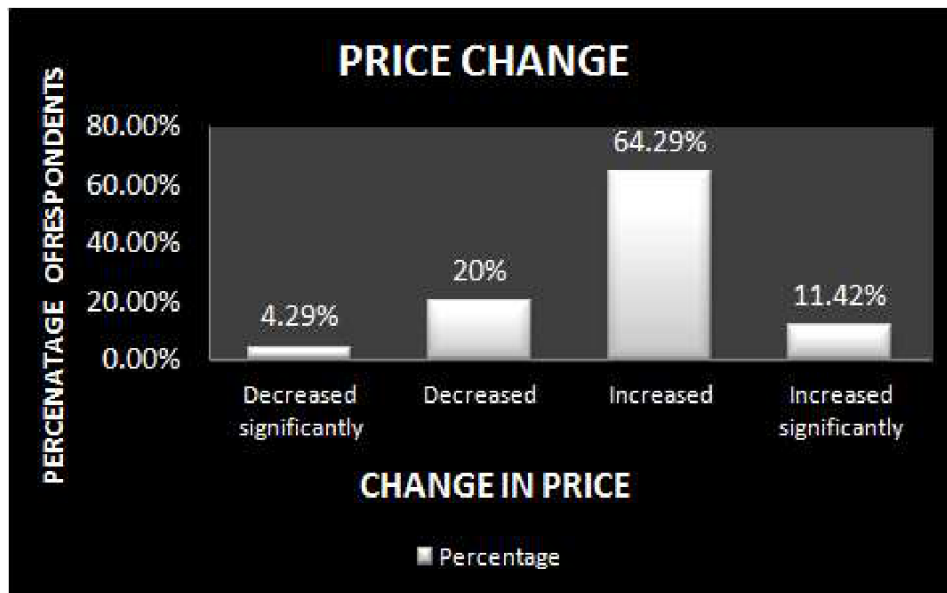


Fig. 2.15

Source : Questionnaire

INTERPRETATION:

From the above chart, it can be inferred that 64.29% of the respondents say that the prices of LED lights have increased in the last year, 20% say that the prices have decreased, 11.42% say that the prices have increased significantly and 4.29% say that the prices of LED lights have decreased significantly in the last year.

2.16 LEADING LED LIGHTING COMPANY IN INDIA



Fig 2.16

Source : Questionnaire

INTERPRETATION:

From the above chart, it is observed that 47.14 % of the respondents say that the leading LED light company in India is Philips, 30% say that it is SYSKA 17.14% say that it is Havells, and 5.72% say that it is Eveready.

2.17 BEST INCENTIVE FOR CHANGE TO MORE EFFICIENT LIGHT BULBS

| Incentive | No.OfRespondants | Percentage |
|--|------------------|------------|
| A Government ban on Light Bulbs that are not efficient | 22 | 31.43% |
| Relatively cheap prices for efficient bulbs | 33 | 47.14% |
| Health Safety | 15 | 21.43% |
| Total | 70 | 100 |

Table 2.17

Source : Questionnaire

INTERPRETATION :

From the above table , it can be inferred that the best incentive to change to more efficient light bulbs for 47.14% of the respondents is relatively cheap prices of efficient bulbs , 31.43% consider the best incentive to be a Government ban on light bulbs that are not efficient and 21.43% consider the best incentive to be health safety .

2.18 RECOMMENDATION OF LED LIGHTS TO OTHERS

| Options | No.OfRespondants | Percentage |
|---------|------------------|------------|
| Yes | 66 | 94.29% |
| No | 4 | 5.71% |
| Total | 70 | 100 |

Table 2.18

Source : Questionnaire

INTERPRETATION:

From the above table, it can be inferred that 94.29% of the respondents would recommend LED lights to others and 5.71 % would not recommend LED lights to others.

2.19 Data Analysis using Chi-square Test for Independence of Attributes

Chi-square test is a statistical method assessing the goodness of fit between a set of observed values and those expected theoretically.

P-value is the level of marginal significance within a statistical hypothesis test representing the probability of occurrence of a given event. The p value is used as an alternative to rejection points to provide the smallest level of significance at which the null- hypotheses would be rejected.

Level of significance- is defined as the probability of rejecting a null hypotheses by the test when it is really true, which is denoted as α . The level of significance is 0.05.

Decision rule is a procedure that the researcher uses to decide whether to accept or reject the null hypotheses.

The overall significance of correlation matters is tested with Bartler's Test of

Spherecity, providing support for the validity of the factor analysis of the data set. It also tests the whether the correlation matrix is also an identity matrix(factor analysis would be meaningless with an identity matrix). A significance value <0.05 indicates that these data do not produce an identity matrix and are thus approximately normal and acceptable for factor analysis.

After the standards indicated that the data are suitable for factor analysis, Principal Component Analysis is employed for extracting the data, which allowed determining the factor underlying the relationships between a number of variable attributes.

2.20 CHI-SQUARE TEST

Chi-square test to test the relationship between the price range of LED lights and the no. of hours the lights are on.

H0 - There is no relation between the price range of LED lights and the no. of hours the lights are on.

H1 - There is a relation between the price range of LED lights and the no of hours the lights are on.

Observed Frequency Table

| Count of How according to you are the prices of LED Lights? | Column Labels | | | | |
|---|------------------|-----------|-----------|-----------|-------------|
| Row Labels | 10 hours or more | 1-2 hours | 3-4 hours | 5-6 hours | Grand Total |
| High | 8 | 1 | 4 | 13 | 26 |
| Low | 1 | 1 | 1 | 1 | 4 |
| Moderate | 3 | 1 | 5 | 24 | 33 |
| Very High | 1 | 2 | 3 | 1 | 7 |
| Grand Total | 13 | 5 | 13 | 39 | 70 |

Table 2.19 (a)

Source : Questionnaire

Expected Frequency Table

| Count of How according to you are the prices of LED Lights? | Column Labels | | | | |
|---|------------------|-----------|-----------|-----------|-------------|
| Row Labels | 10 hours or more | 1-2 hours | 3-4 hours | 5-6 hours | Grand Total |
| High | 4.83 | 1.86 | 4.83 | 14.48 | 26 |
| Low | 0.74 | 0.29 | 0.74 | 2.23 | 4 |
| Moderate | 6.13 | 2.35 | 6.13 | 18.39 | 33 |
| Very High | 1.3 | 0.5 | 1.3 | 3.9 | 7 |
| Grand Total | 13 | 5 | 13 | 39 | 70 |

Table 4.19 (b)

P Value(0.0286) , i.e.(0.03) < Level of significance(0.05)

Since the Chi value is less than 0.05, H₀ is rejected and H₁ is accepted. There is a relation between the price range of LED lights and the no. of hours the lights are on.

III. Findings And Suggestions

3.1 FINDINGS OF THE STUDY

OBJECTIVE 1 :To analyse consumer awareness and perception towards LEDlights

FINDINGS : This survey is based on 70 respondents. The survey results show that more than half of the respondents,i.e.,60% are well aware of the existence of LED Lights but do not have complete knowledge about the same, whereas about 34.29% of the respondents are very well informed about their existence, usage and benefits. There is just a small ratio out the entire population of respondents which are clueless about LED Lights.

The main source of awareness of the green product is advertisements. Family and relatives play a fair role in spreading awareness, whereas Peer groups and Billboards are just additional methods which help in increasing visibility on a smaller scale.

More than half of the respondents, i.e. 57.14 %, perceive LED Lights to be a good product, one-fourth of them agree that it is excellent, whereas a very small ratio say that it is average or poor.

OBJECTIVE 2 : To identify the factors and features by which a consumer is influenced to buy LED lights

FINDINGS : Brightness, purchase price and environmental impact constitute the major attributes which influence a consumer to buy LED lights.

Half of the respondents, i.e. 50% consider all of the above attributes while making a purchase, 20% of them consider only brightness, 15.55% consider purchase price and 14.44% consider environmental impact. The consumers shall be taught about the environmental benefits and the need of using the green product. i.e. LED Lights to increase its consumption.

Different consumers have different perceptions regarding the criteria to be considered while making a purchase decision and have rated them differently.

Some of them have rated health impact to be the most important criteria, whereas others have rated light bulb durability, or low energy consumption or brightness to be the most important one.

OBJECTIVE 3 : To analyse consumer purchase intention towards LED lights

FINDINGS: According to the survey, more than half, i.e., 60% of the respondents are likely to remain loyal towards LED lights upto an increase of just Rs.30, one fourth likely to remain loyal upto an increase of Rs. 50 and a very small ratio, 11.43 % are likely to remain loyal for an increase of Rs. 100 and above. From these figures, it is inferred that as the price of LED lights rises, the loyalty of the respondents towards them decreases due to an already high price range.

The consumers purchase intention decreases with an increase in price.

Majority of the respondents, 94.29 % are likely to recommend LED Lights to others, thus indicating their perception and purchase intention.

3.2 SUGGESTIONS

In order to have a more focused and customer oriented relationship and achieve further success in the future years, the ultimate objective of the marketers has to be to attract more consumers towards green products.

- The prices of LED Lights have to be reduced to increase its consumption.
- The product availability in terms of volume and variety are also important.
- The marketers of green products and services need to be more innovative and dynamic with the changing purchase behavior among customer

IV. Conclusion

Philips Electronics India Limited, a subsidiary of the Netherlands-based Royal Philips Electronics, is the leading Health and Wellbeing Company. Today, Philips is a simpler and more focused company with global leadership positions in key markets of Healthcare,

Lighting and Consumer Lifestyle, addressing people's Health and wellbeing needs and

aspirations as its overarching theme.

As one of the nation's most well-known and well-loved brands, Philips is a part of practically every Indian's life. Philips stands as a source of easy to use, trendy and innovative internationally acclaimed products with superior design and technology that enhance the quality of consumers' professional and personal lives.

Philips has been operating in India for over 80 years and employs over 4,500 employees around the country. The company has an excellent pan India distribution and after-sales service network.

Therefore on the basis of the outcome of objectives, it is very evident that consumer behavior plays a major role in the choice of green products and various factors like Brightness, Environmental impact and Health and safety

greatly influence the buying behavior of consumers while purchasing LED lights. The study also brought out the fact that people are considerably well aware of green products but they are not entirely keen towards it due to a lot of factors and concerns like they are expensive, there is not much difference when compared to traditional products in terms of performance and quality and the commercials being perceived as gimmick and so on.

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