



IMPACT OF DEMAND ANALYSIS ON PIEZOELECTRICITY AS A FUTURE ENERGY SAVER

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ABSTRACT

Electricity shortfall is one of the serious issues in the present as well as the future for which optimizing the electricity in the right way will help to overcome the issue. The usage of coping mechanism for electricity will be one of the effective ways to reduce the electricity shortfall. There are many existing coping mechanisms like Generators, Rechargeable fans & lights, Solar panels, UPS. The piezoelectricity can be included in flooring of indoor sports arena, wooden floorings, sofas, under the flooring mat, under any synthetic flooring. So the piezoelectricity can also be setup at any place where mechanical stress is produced. While walking in the floorings and sitting the sofa will produce the current and the produced current will be stored in the capacitor or batteries. To identify the impact of demand analysis on piezoelectricity as a future energy saver. To identify the factors that influence piezoelectricity. To analyze the satisfaction level of individuals using piezoelectricity as a coping mechanisms. To identify whether awareness program should be conducted about piezoelectricity to public. This article aims to find out how piezoelectricity could be a energy saver to people.

Introduction:

Electricity shortfall is one of the serious issues in the present as well as the future for which optimizing the electricity in the right way will help to overcome the issue. The usage of coping mechanism for electricity will be one of the effective ways to reduce the electricity shortfall. There are many existing coping mechanisms like Generators, Rechargeable fans & lights, Solar panels, UPS. Every coping mechanism has its disadvantage in its own way. Then

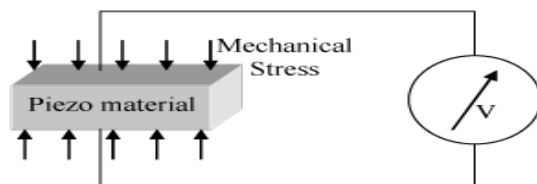
piezoelectricity came into play as coping mechanism, piezoelectricity had various drawbacks but then which was deviated and improvise by 'Laurence Kemball-Cook.' This analysis was conducted to find out the demand of piezoelectricity effect as one of the coping mechanism for electricity shortfall.

Piezoelectric effect:

The ability of certain materials to generate an electric charge in response to applied mechanical stress is piezoelectric effect.

Piezoelectric diode:

Pierre Curie founded the piezoelectric effect in 1880, but it started to be used for industrial sensing application in 1950. Piezoelectric sensor is used to convert the mechanical stress into electric charge. Piezoelectric diode is a coin sized diode (Diode is nothing but a semiconductor



device with two terminals, typically allowing the flow of current in one direction only).

In 2009, Laurence kemball-Cook improvised this diode into a flooring material and name it as 'pavegen tiles.' The improvised tile provides electricity when we step on to it. The idea has been implemented in London, Brazil & China. As the current flows in one direction, there will not be any electric shock when the mechanical stress is produced. The current produced by piezoelectric can be stored in batteries and capacitors. The current stored can be discharged whenever required.

Application of piezoelectricity:

The piezoelectricity can be included in flooring of indoor sports arena, wooden floorings, sofas, under the flooring mat, under any synthetic floorings. At present it has been implemented in the streets of London which is then termed as first Smart Street in the world. So the piezoelectricity can also be setup at any place where mechanical stress is produced. While walking in the floorings and sitting the sofa will produce the current and the produced current will be stored in the capacitor or batteries.

Advantages:

- Cost efficient when compared to setting up solar panels.
- Environment friendly when we compare it to the usage of generators which produce air & noise pollution.
- Piezoelectricity has long life span when compared to rechargeable fans and lights.
- The improvised product is easily feasible.

Drawbacks:

- It doesn't produce enough electricity. (This drawback has been corrected by placing 3 diodes i.e. crystals under the tile, by this it is able to produce enough electricity).
- It doesn't work under all conditions and temperature. (This drawback has been deviated by installing a thermostat with the piezoelectric crystals).
- If the piezoelectric crystal is damaged, the whole setup has to be replaced. (This drawback has been deviated by making each piezoelectric connection individually to the wireless chip in the system).

Research Methodology:**Statement Of the problem**

To identify the demand of piezoelectric as a coping mechanism in the future.

Objectives:

- To identify the factors that influence piezoelectricity.
- To analyze the satisfaction level of individuals using piezoelectricity as coping mechanisms.
- To identify whether awareness program should be conducted about piezoelectricity.

Need for the study:

- It helps us to forecast the demand of piezoelectricity as coping mechanism in the future.
- It helps us to identify the factors affecting coping mechanism

Scope of the study:

- The study is focused on the factors influencing the demand of the piezoelectricity like electricity shortfall, cost effectiveness, environment friendly and life span.

Research Design:

The research design undertaken for the study is Non-probability sampling and it is defined as a sampling technique in which the researcher selects samples based on the subjective judgment of the researcher rather than random selection. It is a less stringent method.

Sampling:**Sampling size:**

Total number of respondents is 106

Sampling method:

Convenience sampling method is been used where the sample is taken from a group of people easy to contact or to reach.

Sources of data:**Primary data:**

Primary data for this study was collected through questionnaire.

Secondary data:

Secondary data like about the product, applications of the product, improvisation of the products, implementation was collected

through websites, articles, journals and case study.

Limitations:

- Respondents may not feel encouraged to provide accurate, honest answers.
- Respondents may not feel comfortable providing answers that present themselves in a unfavorable manner.
- Respondents may not be fully aware of their reasons for any given answer because of lack of memory on the subject

Data Analysis

Percentage analysis

1. Electricity shortfall is a serious problem

Particulars	% of respondents
Strongly agree	38.7
Agree	57.5
Neutral	1.9
Disagree	1.9

Interpretation:57.5% respondents agree with electricity shortfall has a serious problem 38.7% respondents agree with electricity shortfall has a serious problem,1.9% respondents feel neutral with electricity shortfall and 1.9% respondents strongly disagree with electricity shortfall.

2. Coping mechanism to help reduce electricity shortfall

Particulars	% of respondents
Strongly agree	57.5
Agree	33
Neutral	5.75
Disagree	3.75

Interpretation:57.5% respondents strongly agree with coping mechanism to help reduce electricity shortfall.33% respondents agree with coping mechanism to help reduce electricity shortfall.5.75% respondents feel neutral with coping mechanism to reduce electricity shortfall.3.75%respondents strongly disagree with coping mechanism to help reduce electricity shortfall.

3. Types of coping mechanism

Particulars	% of respondents
Generators	13.2
Recharagable Fans or lights	9
Solar panels	70.8
Wind turbines	4
UPS	3

Interpretation: 70.8% of respondents feel solar panels are better choice of coping mechanism for electricity.13.2% of respondents feel generators are better choice of coping mechanism for electricity.9% of respondents feel rechargeable fans or lights are better choice of coping mechanism.4% of respondents feel wind turbines are better choice of coping mechanism.3% of respondents feel UPS are better choice of coping mechanism.

4.Coping mechanism should be cost effective, environment friendly, feasible and have a long lifespan

Particulars	% of respondents
Strongly agree	46.2
Agree	41.5
Neutral	5.8
Disagree	3.9
Strongly disagree	2.6

Interpretation:46.2% respondents strongly agree that coping mechanism should be cost effective environment friendly feasible and have a long life span.41.5% respondents agree that coping mechanism should be cost effective environment friendly feasible and have a long life span.5.8%respondents feel neutral that coping mechanism should be cost effective environment friendly feasible and have a long life span.3.9%respondents disagree that coping mechanism should be cost effective environment friendly feasible and have a long life span.2.6%respondents strongly disagree that coping mechanism should be cost effective environment friendly feasible and have a long life span

5.People are not aware about piezoelectric generators or piezoelectric effect as a copingmechanism

Particulars	% of respondents
Strongly agree	40.6
Agree	44.3
Neutral	11.3
Disagree	1.2
Strongly disagree	2.6

Interpretation:40.6% respondents strongly agree that they are not aware about piezoelectric generators or piezoelectric effect as a coping mechanism.44.3%respondents agree that they are not aware about piezoelectric generators or piezoelectric effect as a coping mechanism.11.3%respondents feel neutral that they are not aware about piezoelectric generators or piezoelectric effect as a coping mechanism.1.2%respondents disagree that they are not aware about piezoelectric generators or piezoelectric effect as a coping mechanism.2.6%respondents strongly disagree that they are not aware about piezoelectric generators or piezoelectric effect as a coping mechanism

6. Piezoelectric is cost effective, environment friendly, feasible and have a long life span.

Particulars	% of respondents
Strongly agree	34.9
Agree	44.3
Neutral	16
Disagree	3.2
Strongly disagree	1.6

Interpretation:34.9% of respondents strongly agree Piezoelectric is cost effective, environment friendly, feasible and have a long life span.44.3%of respondents strongly agree Piezoelectric is cost effective, environment friendly, feasible and have a long life span.16%of respondents feel neutral Piezoelectric is cost effective, environment friendly, feasible and have a long life span.3.2%of respondents disagree Piezoelectric is cost effective, environment friendly, feasible and have a long life span.1.6%of respondents strongly disagree Piezoelectric is cost effective, environment friendly, feasible and have a long life span

7.Awareness should be created about piezoelectric so it can be setup to reduce the shortfall.

Particulars	% of respondents
Strongly agree	39.6
Agree	50.9
Neutral	4.7
Disagree	3.5
Strongly disagree	1.1

Interpretation:39.6% of respondents strongly agree awareness should be created about piezoelectric so it can be setup to reduce the shortfall.50.9% of respondents agree awareness should be created about piezoelectric so it can be setup to reduce the shortfall.4.7%of respondents feel neutral that awareness should be created about piezoelectric so it can be setup to reduce the shortfall.3.5%of respondents disagree awareness should be created about piezoelectric so it can be setup to reduce the shortfall.1.1%of respondents strongly disagree awareness should be created about piezoelectric so it can be setup to reduce the shortfall

Chi-square test:

Objective: To identify the relationship between electricity shortfall and using piezoelectric as the coping mechanism.

H₀: There is no significant relationship between a satisfaction level of lighting and healthy environment

H₁: There is a significant relationship between satisfaction level of lighting and healthy environment

Inference:

The chi-square statistic is 17.2422 and from the above chi-square test it is inferred that the calculated value is lesser than the significant value i.e. $0.001734 < 0.05$. The Alternate hypothesis is accepted. Therefore, there is significant relationship between electricity shortfall is a serious problem and piezoelectric can be used as coping mechanism.

Findings:

1.49.1%of respondents strongly agree that electricity should be optimized properly to reduce the shortfall,45.3%of respondents agree

that electricity should be optimized properly to reduce the shortfall. 3.8% of respondents feel neutral that electricity should be optimized properly to reduce the shortfall. 1.8% of respondents disagree that electricity should be optimized properly to reduce the shortfall

2. 58.5% agree UPS and Rechargeable fans & lights have short lifespan. 22.6% strongly agree UPS and Rechargeable fans & lights have short lifespan. 15.1% feel neutral UPS and Rechargeable fans & lights have short lifespan. 3.8% disagree UPS and Rechargeable fans & lights have short lifespan.

3. 50% agree that generators contaminate the environment by air pollution & noise pollution 28.3% strongly agree that generators contaminate the environment by air pollution & noise pollution 12.3% neutral that generators contaminate the environment by air pollution & noise pollution 9.4% disagree that generators contaminate the environment by air pollution & noise pollution 4.35.8% agree that solar panel is not cost efficient 21.7% strongly agree that solar panel is not cost efficient 20.8% feel neutral that solar panel is not cost efficient 17% disagree that solar panel is not cost efficient 4.7% strongly disagree that solar panel is not cost efficient

5. 48.1% agree that wind energy turbine is not feasible in the city. 30.2% strongly agree that wind energy turbine is not feasible in the city. 16% feel neutral that wind energy turbine is not feasible in the city. 3.3% disagree that wind energy turbine is not feasible in the city 2.4% strongly disagree that wind energy turbine is not feasible in the city.

6. 48.1% agree that existing coping mechanism is not highly efficient so necessary measures have to be taken to reduce the shortfall. 31.1% strongly agree that existing coping mechanism is not highly efficient so necessary measures have to be taken to reduce the shortfall. 14.2% feel neutral that existing coping mechanism is not highly efficient so necessary measures have to be taken to reduce the shortfall. 3.8% disagree that existing coping mechanism is not highly efficient so necessary measures have to be taken to reduce the shortfall. 2.8% strongly disagree that existing coping mechanism is not highly efficient so necessary measures have to be taken to reduce the shortfall

7. 70.5% of respondents said yes that they would buy piezoelectric to reduce the electricity shortfall 29.5% of respondents said no that they would buy piezoelectric to reduce the electricity shortfall

Suggestions:

1. Electricity shortfall is a serious problem and electricity should be optimized properly to reduce the scarcity.
2. People use coping mechanisms like UPS, generators, rechargeable fans & lights and solar panels but they feel the existing coping mechanism is not highly efficient and cost effective.
3. People are not aware of piezoelectricity thus awareness program should be conducted by which everyone can use it.
4. Piezoelectric could be cost effective; environment friendly, and can give a long life span

Conclusion:

If electricity is not optimized properly then there will be more demand for electricity. Piezoelectricity has been implemented and it has more demand across European countries. It is emerging across Asian countries at present and various implementations are done in some of the Asian countries. Awareness should be created across India and people should be thought about piezoelectricity. As piezoelectricity is cost efficient, environment friendly, has a long life span so this can be used as coping mechanism in the future. Thus the demand of the piezoelectricity will be high in the future. With piezoelectricity it is not only saving electricity but also a energy saver and thus it could be concluded as 'The future is beneath our feet'.

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