

## **General Public's Awareness, Attitude towards Carbon Trading and their Perception about Impact of Carbon Trading on the Environment**

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**Abstract:** *Carbon trading is a form of trading that specifically targets carbon dioxide and it currently constitutes the bulk of emissions trading. The correlation analysis shows that the awareness and attitude of general public towards carbon trading and their perception about impact of carbon trading on the environment are positively and moderately correlated with each other at one per cent level of significance. The exploratory factor analysis indicates that uncertainty, lack of technology, high cost, low value and lack of adoptability are issues related to carbon trading. The regression analysis reveals that uncertainty, high cost and low value have negative impact on environment at one per cent level of significance. The general public should be made aware of impact of carbon trading on environment such as promoting soil health, improving ecological diversity, enhancing bio diversity, mitigating natural disasters, enhancing natural resource conservation, reducing resource depletion, reducing coastal and marine pollution and enhancing environmental sustainability by concerned competing authorities. The issues of uncertainty, high cost and low value related to carbon trading should be removed through appropriate production and marketing strategies by respective stakeholders of carbon trading.*

**Keywords:** *Attitude, Awareness, Carbon Trading, Environment, Perception.*

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### **1. INTRODUCTION**

Carbon trading is a form of trading that specifically targets carbon dioxide and it currently constitutes the bulk of emissions trading. This form of permit trading is a common method countries utilize in order to meet their obligations specified by the Kyoto Protocol; namely the reduction of carbon emissions in an attempt to reduce (mitigate) future climate change.

Carbon trading is a key policy tool created specifically to address the pressing issue of climate change. Carbon trading has the potential to stabilize current concentrations of atmospheric greenhouse gas at levels that would prevent dangerous climate change. The stated aims of a global carbon trading are threefold. The primary purpose of global carbon trading is to give carbon an economically quantifiable value; the second is to ensure that this economic value is reflected and accounted for in the pricing of goods and services in which carbon is embedded; and finally to incentivise the economy-wide adoption of low carbon technologies and practices (James, 2007).

Compliance based carbon markets, such as the European Union-Emission Trading System (EU-ETS) are created and driven by international policy implemented on a national and regional scale. The demand for approved carbon credits has been created as a result of mandatory national, regional or international carbon reduction regimes such as a carbon cap-and-trade system in which sectors or individual companies are allotted a carbon budget, one which they cannot exceed without a penalty of some sort. The unused portion of an entity's carbon budget may be sold to another entity company,

which has exceeded its own allotted budget or merely wishes to purchase credits for use at a later date. In the case of voluntary carbon markets, participation is not driven by carbon budgets or legal regulations.

Carbon trading is therefore seen as an opportunity for developing countries in need of funds to spur their development. The corporate actors involved in carbon trading and some mainstream non-governmental organizations (NGOs) also regard it as being less about achieving structural change, and more about building partnerships between business and government with a view to achieving pragmatic and incremental change.

Market proponents generally attribute the success of the system to the creation of a commodity which puts a price on pollution, thereby incentivising a reduction in emissions and the development of new carbon-friendly technologies. However, many others criticize it on environmental and social justice grounds. In practice, carbon trading has failed to incentivise emissions reductions. Carbon trading attracts ‘low-hanging fruit’, or projects that are easy to implement and allow the easy calculation of emission reductions, which usually means that they do not support the longer-term goal of moving to low-carbon development (Jan - Peter, 2007). Therefore, the present research is attempted to study general public’s awareness, attitude towards carbon trading and their perception about impact of carbon trading on the environment in Tamil Nadu.

## 2. METHODOLOGY

Tamil Nadu is one of the states which have considerable industrial growth in India. The people in Tamil Nadu state have to consume more amounts of industrial pollutants, sludge and also hazardous waste and also pollution from stagnated water. This situation enforces all the people and industrialists to know more about the impact of carbon trading, impact of pollution, Green house effect and also the effect from the hazardous waste from industrial sectors. Therefore, the Tamil Nadu State has been purposively selected for the present study. The data and information have been collected from 600 general public by adopting random sampling technique.

The mean and standard deviation have been worked out for awareness about carbon trading, attitude towards carbon trading and perception about impact of carbon trading on the environment. The multiple correlation analysis has been carried out to study the relationship between awareness, attitude towards carbon trading and perception about impact of carbon trading on the environment. In order to identify the issues related to carbon trading, the exploratory factor analysis has been employed. In order to examine the impact of issues related to carbon trading on environment, the multiple linear regression has been applied.

## 3. RESULTS AND DISCUSSION

### 3.1. Awareness of the General Public about Carbon Trading

The awareness of the general public about carbon trading was analyzed and the results are presented in Table 1.

**Table1.** Awareness of the general public about carbon trading

| Sl. No. | Particulars   | Mean Score | Standard Deviation |
|---------|---|------------|--------------------|
| 1.      | Carbon trading reduces carbon emissions   | 3.63       | 0.82               |
| 2.      | Carbon trading creates environmental concern  | 3.32       | 0.76               |
| 3.      | Carbon trading scheme is an incentive of saving money by cutting emissions  | 3.64       | 0.75               |
| 4.      | Carbon trading has a greater potential for engaging individuals in climate change than ‘upstream’ emissions trading schemes | 3.38       | 0.74               |
| 5.      | Carbon trading provides low-carbon alternatives   | 3.68       | 0.74               |
| 6.      | Carbon trading is fair and effective  | 3.60       | 0.75               |
| 7.      | Carbon trading converts an environmental threat to a revenue generating opportunity   | 3.32       | 0.69               |
| 8.      | Carbon trading provides an opportunity to generate income from activities that previously attracted no additional revenue   | 3.65       | 0.73               |
| 9.      | Carbon trading provides reduction in overall cost of meeting emission reduction targets                                     | 3.31       | 0.67               |
| 10.     | Carbon trading improve the quality of life  | 3.60       | 0.69               |

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The results show that the general public are agreed with the idea that carbon trading reduces carbon emissions, carbon trading scheme is an incentive of saving money by cutting emissions, carbon trading provides low-carbon alternatives, carbon trading is fair and effective, carbon trading provides an opportunity to generate income from activities that previously attracted no additional revenue and carbon trading improve the quality of life, while, they are neutral with carbon trading creates environmental concern, carbon trading has a greater potential for engaging individuals in climate change than 'upstream' emissions trading schemes, carbon trading converts an environmental threat to a revenue generating opportunity and carbon trading provides reduction in overall cost of meeting emission reduction targets.

### 3.2. Attitude of the General Public towards Carbon Trading

The attitude of the general public towards carbon trading was analyzed and the results are presented in Table 2.

**Table 2.** Attitude of the general public towards carbon trading

| Sl. No. | Particulars  | Mean Score | Standard Deviation |
|---------|--|------------|--------------------|
| 1.      | Being able to measure my carbon footprint is important to me                         | 3.82       | 0.74               |
| 2.      | I accept a carbon trading system as a tool for improving the environment             | 3.87       | 0.65               |
| 3.      | A carbon trading system would encourage me to reduce my carbon footprint             | 3.22       | 0.78               |
| 4.      | Carbon trading system would encourage me to walk or cycle more and drive less        | 3.84       | 0.73               |
| 5.      | People who reduce their carbon footprint should be rewarded in some way              | 3.18       | 0.89               |
| 6.      | People with a greater carbon footprint should have to pay for it in some way         | 3.82       | 0.80               |
| 7.      | Carbon trading system would encourage me to eat more healthy, locally grown produce  | 3.86       | 0.76               |
| 8.      | Carbon trading system would be useful for me to help monitor my environmental impact | 3.91       | 0.73               |
| 9.      | Comparing my carbon usage to the average would influence my consumption habits       | 3.83       | 0.83               |
| 10.     | There is a strong link between a person's carbon footprint and their health          | 3.35       | 0.88               |

The results indicate that the general public agreed with the concept that measuring their carbon footprint is important to them, they accept a carbon trading system as a tool for improving the environment, carbon trading system would encourage them to walk or cycle more and drive less, people with a greater carbon footprint should have to pay for it in some way, carbon trading system would encourage them to eat more healthy, locally grown produce, carbon trading system would be useful for them to help monitor their environmental impact and comparing their carbon usage to the average would influence their consumption habits, while, they are neutral with a carbon trading system would encourage them to reduce their carbon footprint, people who reduce their carbon footprint should be rewarded in some way and there is a strong link between a person's carbon footprint and their health.

### 3.3. Perception of General Public about Impact of Carbon Trading on the Environment

The perception of general public about impact of carbon trading on the environment was analyzed and the results are presented in Table 3.

The results reveal that the general public agreed with the idea of reducing land degradation, reducing soil degradation, improving water quality, improving air quality, reduction of atmospheric temperature, reducing air pollution, reducing water pollution, reducing soil pollution, reducing solid waste pollution, reducing deforestation and reducing climate change, while, they are neutral with promoting soil health, improving ecological diversity, enhancing bio diversity, mitigating natural disasters, enhancing natural resource conservation, reducing resource depletion, reducing coastal and marine pollution and enhancing environmental sustainability.

**Table3.** Perception of general public about impact of carbon trading on the environment

| Sl. No. | Particulars                             | Mean Score | Standard Deviation |
|---------|---|------------|--------------------|
| 1.      | Reducing Land Degradation               | 3.77       | 0.96               |
| 2.      | Reducing Soil Degradation               | 3.69       | 0.90               |
| 3.      | Promoting Soil Health                   | 3.32       | 1.01               |
| 4.      | Improving Ecological Diversity          | 3.25       | 1.20               |
| 5.      | Improving Water Quality                 | 3.68       | 0.99               |
| 6.      | Improving Air Quality                   | 3.66       | 0.96               |
| 7.      | Enhancing Bio Diversity                 | 3.40       | 1.04               |
| 8.      | Reduction of Atmospheric Temperature    | 3.82       | 1.15               |
| 9.      | Mitigating Natural Disasters            | 3.38       | 0.97               |
| 10.     | Enhancing Natural Resource Conservation | 3.36       | 1.02               |
| 11.     | Reducing Air Pollution                  | 3.71       | 1.12               |
| 12.     | Reducing Water Pollution                | 3.76       | 1.06               |
| 13.     | Reducing Soil Pollution                 | 3.68       | 1.34               |
| 14.     | Reducing Solid Waste Pollution          | 3.74       | 1.17               |
| 15.     | Reducing Resource Depletion             | 3.24       | 1.42               |
| 16.     | Reducing Deforestation                  | 3.80       | 1.16               |
| 17.     | Reducing Coastal and Marine Pollution   | 3.37       | 0.98               |
| 18.     | Reducing Climate Change                 | 3.98       | 1.34               |
| 19.     | Enhancing Environmental Sustainability  | 3.43       | 1.34               |

### 3.4. Relationship between Awareness of General Public, Attitude towards Carbon Trading and their Perception about Impact of Carbon Trading on the Environment

In order to study the relationship between awareness of general public, attitude towards carbon trading and their perception about impact of carbon trading on the environment, the correlation analysis has been employed and the results are presented in Table 4.

**Table4.** Relationship between awareness of general public, attitude towards carbon trading and their perception about impact of carbon trading on the environment

| Particulars | Awareness   | Attitude    | Perception  |
|-------------|-------------|-------------|-------------|
| Awareness   | <b>1.00</b> |             |             |
| Attitude    | 0.53**      | <b>1.00</b> |             |
| Perception  | 0.56**      | 0.58**      | <b>1.00</b> |

\*\* Significance at one per cent level

The results show that the correlation coefficient between awareness and attitude of general public towards carbon trading is 0.53, which is positively and moderately associated with each other at one per cent level of significance.

The results indicate that awareness of general public towards carbon trading and their perception about impact of carbon trading on the environment is also positively and moderately correlated with each other with the value of 0.56, which is significant at one per cent level.

The results reveal that the correlation coefficient between attitude of general public towards carbon trading and their perception about impact of carbon trading on the environment is 0.58, which is positively and moderately associated with each other at one per cent level of significance.

### 3.5. Identification of Issues Related to Carbon Trading

In order to identify the issues related to carbon trading, the exploratory factor analysis has been employed. The principal component method of factor analysis was carried out with Eigen values greater than one through varimax rotation and the results obtained through rotated component matrix are presented in Table 5. The results of Kaiser-Meyer-Olkin (KMO test) measure of sampling adequacy (KMO = 0.759) and Bartlett's test of Sphericity (Chi-square value = 0.0045; Significance = 0.000) indicates that the factor analysis method is appropriate.

There are five independent groups which are extracted accounting for a total of 69.60 per cent of variations on 20 variables. The each of the five factors contributes to 19.07 per cent, 17.11 per cent, 13.08 per cent, 10.68 per cent and 9.66 per cent respectively.

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**Table5.** Identification of issues related to carbon trading -exploratory factor analysis

| Factor     | Particulars   | Rotated Factor Loadings | Eigen Value | % of Variation | Factor Name                 |
|------------|---|-------------------------|-------------|----------------|-----------------------------|
| <b>I</b>   | Lack of Accounting Standards                                | 0.81                    | 2.37        | 19.07          | <b>Uncertainty</b>          |
|            | Ambiguity in Taxation for Carbon Trading                    | 0.79                    |             |                |                             |
|            | Cost-Benefit Mismatch                                       | 0.57                    |             |                |                             |
|            | Uncertain Carbon Market                                     | 0.85                    |             |                |                             |
|            | Lack of Clear Regulations                                   | 0.65                    |             |                |                             |
| <b>II</b>  | Unavailable Cleaner Technology Options                      | 0.89                    | 2.28        | 17.11          | <b>Lack of Technology</b>   |
|            | Lack of Technical Know-How                                  | 0.64                    |             |                |                             |
|            | Uncompetitive Technologies                                  | 0.67                    |             |                |                             |
|            | Non Suitability of International Technologies               | 0.63                    |             |                |                             |
| <b>III</b> | High Transaction Costs                                      | 0.69                    | 1.48        | 13.08          | <b>High Cost</b>            |
|            | Short Crediting Periods                                     | 0.62                    |             |                |                             |
|            | Higher Capital Investment                                   | 0.67                    |             |                |                             |
|            | Inability to Access More Efficient Technologies and Finance | 0.69                    |             |                |                             |
| Factor     | Particulars   | Rotated Factor Loadings | Eigen Value | % of Variation | Factor Name                 |
| <b>IV</b>  | Cost Uncertainty  | 0.60                    | 1.23        | 10.68          | <b>Low Value</b>            |
|            | Setting Project Baselines                                   | -0.68                   |             |                |                             |
|            | Low Prices for Carbon Assets                                | -0.74                   |             |                |                             |
|            | Limited Access to Private Capital                           | 0.70                    |             |                |                             |
| <b>V</b>   | Poor Emission Monitoring and Enforcement Mechanisms         | -0.87                   | 1.07        | 9.66           | <b>Lack of Adoptability</b> |
|            | Low Technology Transfer                                     | 0.81                    |             |                |                             |
|            | Lack of Human Capacity to Adopt More Advanced Technologies  | 0.93                    |             |                |                             |
|            | Cumulative % of Variation                                   | -                       | -           | 69.60          | -                           |
|            | Cronbach’s Alpha  | -                       | -           | -              | 0.81                        |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 11 iterations.

**Factor - I:** From the results, it is inferred that out of 20 variables, five variables have their high, relatively tightly grouped factor loadings on factor - I.

This factor consists of:

- Lack of Accounting Standards (0.81)
- Ambiguity in Taxation for Carbon Trading (0.79)
- Cost-Benefit Mismatch (0.57)
- Uncertain Carbon Market (0.85)
- Lack of Clear Regulations (0.65)

Hence, this factor is named as “**Uncertainty**”.

**Factor - II:** is formed with:

- Unavailable Cleaner Technology Options (0.89)
- Lack of Technical Know-How (0.64)

- Uncompetitive Technologies (0.67)
- Non Suitability of International Technologies (0.63)

These variables are named as “**Lack of Technology**”.

**Factor - III:** This factor includes:

- High Transaction Costs (0.69)
- Short Crediting Periods (0.62)
- Higher Capital Investment (0.67)
- Inability to Access More Efficient Technologies and Finance (0.69)

These variables are named as “**High Cost**”.

**Factor - IV:** This factor is formed with:

- Cost Uncertainty (0.60)
- Setting Project Baselines (-0.68)
- Low Prices for Carbon Assets (-0.74)
- Limited Access to Private Capital (0.70)

This factor is named as “**Low Value**”.

**Factor - V:** is formed with:

- Poor Emission Monitoring and Enforcement Mechanisms (-0.87)
- Low Technology Transfer (0.81)
- Lack of Human Capacity to Adopt More Advanced Technologies (0.93)

These variables are named as “**Lack of Adoptability**”.

The Cronbach’s Alpha of the scale was 0.81 indicating that each measure demonstrated acceptable internal consistency. It is inferred that uncertainty, lack of technology, high cost, low value and lack of adoptability are issues related to carbon trading.

### 3.6. Impact of Issues Related to Carbon Trading on Environment

In order to examine the impact of issues related to carbon trading on environment, the multiple linear regression has been applied and the results are presented in Table 6. The issues related to carbon trading derived through exploratory factor analysis are considered as independent variables and the environment is considered as dependent variable.

**Table6.** *Impact of issues related to carbon trading on environment*

| Issues Related to Carbon Trading       | Regression Co-efficients | t - Value | Sig. |
|--|--------------------------|-----------|------|
| Intercept                              | 1.107**                  | 3.792     | .000 |
| Uncertainty (X <sub>1</sub> )          | -.389**                  | 4.104     | .000 |
| Lack of Technology (X <sub>2</sub> )   | -.136                    | 1.472     | .402 |
| High Cost (X <sub>3</sub> )            | -.402**                  | 3.965     | .010 |
| Low Value (X <sub>4</sub> )            | -.360**                  | 3.896     | .010 |
| Lack of Adoptability (X <sub>5</sub> ) | -.143                    | 1.328     | .386 |
| R <sup>2</sup>                         | 0.59                     | -         | -    |
| Adjusted R <sup>2</sup>                | 0.57                     | -         | -    |
| F                                      | 19.746                   | -         | 0.00 |
| N                                      | 600                      | -         | -    |

**Note:** \*\* Significance at one percent level

The results indicate that the coefficient of multiple determination (R<sup>2</sup>) is 0.59 and adjusted R<sup>2</sup> is 0.57 indicating the regression model is good fit. It is inferred that about 57.00 per cent of the variation in dependent variable (Environment) is explained by the independent variables (Issues Related to Carbon Trading). The F-value of 19.746 is statistically significant at one per cent level indicating that

the model is good fit. The results show that uncertainty, high cost and low value have negative impact on environment at one per cent level of significance.

#### **4. CONCLUSION**

The results show that the general public is agreed with carbon trading reduces carbon emissions, carbon trading scheme is an incentive of saving money by cutting emissions, carbon trading provides low-carbon alternatives, carbon trading is fair and effective, carbon trading provides an opportunity to generate income from activities that previously attracted no additional revenue and carbon trading improve the quality of life.

The results indicate that the general public is agreed with being able to measure their carbon footprint is important to them, they accept a carbon trading system as a tool for improving the environment, carbon trading system would encourage them to walk or cycle more and drive less, people with a greater carbon footprint should have to pay for it in some way, carbon trading system would encourage them to eat more healthy, locally grown produce, carbon trading system would be useful for them to help monitor their environmental impact and comparing their carbon usage to the average would influence their consumption habits.

The results reveal that the general public is agreed with reducing land degradation, reducing soil degradation, improving water quality, improving air quality, reduction of atmospheric temperature, reducing air pollution, reducing water pollution, reducing soil pollution, reducing solid waste pollution, reducing deforestation and reducing climate change.

The correlation analysis shows that the awareness and attitude of general public towards carbon trading and their perception about impact of carbon trading on the environment are positively and moderately correlated with each other at one per cent level of significance.

The exploratory factor analysis indicates that uncertainty, lack of technology, high cost, low value and lack of adoptability are issues related to carbon trading. The regression analysis reveals that uncertainty, high cost and low value have negative impact on environment at one per cent level of significance.

Since the carbon trading creates environmental concern and it has a greater potential in climate change than 'upstream' emissions trading schemes, the general public should be encouraged to involve in various environmental conservation activities by the concerned environmental related activities. The ecosystem must encourage general public to reduce their carbon footprint through carbon trading and general public should be rewarded for their carbon footprint reduction. The general public must be made to understand a strong link between a person's carbon footprint and their health through proper propaganda.

The general public should be made aware of impact of carbon trading on environment such as promoting soil health, improving ecological diversity, enhancing bio diversity, mitigating natural disasters, enhancing natural resource conservation, reducing resource depletion, reducing coastal and marine pollution and enhancing environmental sustainability by concerned competing authorities. The issues of uncertainty, high cost and low value related to carbon trading should be removed through appropriate production and marketing strategies by respective stakeholders of carbon trading.

Besides, it is suggested to reduce the difficulty in adopting low carbon energy technologies and high volatile in carbon pricing. It is also suggested to improve the infrastructure, competitive public-private partnership, institutional mechanisms, political intervention and international business networks for efficient carbon trading. Thus, mass awareness on carbon trading through widespread education is required, to provide our future generations the better cleaner environment. Meanwhile, NGOs should offer many free guides about carbon trading in order to enhance the knowledge and attitude towards carbon trading among the general public.

Therefore, it is possible that perceptions of the impact of carbon trading on the environment could be changed by introducing it as a carbon tax, to help remind people of the policy aim and also stimulate environmentally astute behaviour.

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