

# **Impacts of Carbon Taxation System on Local Industries Growth (Lahore case study)**



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A thesis submitted in partial fulfillment of the requirements for the  
degree of MS Urban & Regional Planning Thesis.

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## THESIS ACCEPTANCE CERTIFICATE

Certified that final copy of the thesis titled “Impacts of carbon Taxation System on Local Industries Growth (Lahore Case Study)” written by Ms. Aqsa Wafa (Registration No. 00000203939), of Urban and Regional Planning (NIT-SCEE) has been vetted by the undersigned, found complete in all respects as per NUST Statutes/Regulations, is free of Plagiarism, errors and mistakes and is accepted as partial fulfillment for the award of MS degree. It is further certified that necessary amendments as pointed out by GEC members of the scholar have also been incorporated in the said thesis.

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## **DEDICATION**

This thesis is dedicated to my family specially my grandmother for always being a source of love and prayers.

## **ACKNOWLEDGEMENT**

As a matter of first importance, acclaims and gratitude to the Allah Almighty, for His showers of blessings all through my research work to finish the research effectively.

I might want to communicate my profound and earnest appreciation to my Research Supervisor, Dr. Abdul Waheed, for giving me significant direction all through this research phase. His assistance and valuable feedback enabled me to achieve a solution-oriented research experience. Intellectual input and assistance at every stage enabled me to gain valuable knowledge and a better solution to the problems faced during the research phase.

**Aqsa Wafa**

## ABSTRACT

With the growing population of Pakistan, Industrial activities are also increasing day by day which leads to toxic gases emissions (SO, CO<sub>2</sub> and particular matters, etc.) during the production process. But CO<sub>2</sub> is considered more important GHG Gas. From 1951 to 2016, Carbon emissions are increasing at an exponential rate in Pakistan as well which is the major cause of global warming; It is assumed that if there were no greenhouse gas, the earth would be much cold and the average earth temperature would be -18 degree Celsius (Qiancheng Ma, 1998). According to the global atlas report 2016, Pakistan Ranked 31st country in carbon emissions by producing 187 Mt CO<sub>2</sub> out of the world total 35675 mt CO<sub>2</sub>. Internationally, Carbon Taxation is considered a solution to emissions reductions. The objective of the research is to assess the chronological history of the carbon tax, Impacts of Carbon Tax (Price, Location, and Socioeconomic), Acceptability of Carbon Tax, Drivers and Barriers in Implementation, and future recommendations.

The impacts of Carbon Taxation on local Industries Growth have been assessed by using a random sampling technique in the Lahore case study area. Data of 105 industrial units have been collected and analyzed in SPSS. The results show that low awareness about carbon taxation System-related terms and there is a high level of acceptability of carbon taxation system in industries. The results of regression analysis depicted the high probability of acceptance of the carbon taxation system in relation with age, education, experience, and awareness variables. Locational Impacts are also minimal as the majority of respondents do not agree to relocate after the imposition of a carbon tax on the industry. Indicator base socioeconomic impact assessment reveals the high and positive impact on buying power, moderate impact on saving, uplift economic conditions, preservation of the environment, and living standard. the negative value of transformed values shows the low and adverse impacts of the Carbon taxation system on health, Employability, poverty, Climatic condition, family expenditures, green energy products, and quality of products which needs government interventions in form of tax exemptions or subsidies to minimize the distributional impacts of carbon taxations system.

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# Chapter 1

## INTRODUCTION

### 1.1 Introduction and background

Pakistan is the 5th largest country in population in the world having more than 212.2 million populations. Its territory was the site of several earliest civilizations and its area has been ruled by many dynasties. The estimated population growth rate of Pakistan is 2.00% (2019-20) which is quite higher than many other developing countries. By comparing census data of the last two census reports, the population of Pakistan is rapidly increasing and this growing population of Pakistan is increasing demand for Industrial Products as well. Therefore, Industrial activities are also increasing day by day in the country. In addition, according to an inception report of the environmental planning and protection department-Punjab (2018), Pakistan has immense economic potential and has a probability to become one of the world's top twenty largest economies by 2050.

Furthermore, GDP growth reached 5.28% in 2016-17 which is the highest in the last 10 years with 3.46% growth in agriculture, 5.02% in the industrial sector, and 5.98% is witnessed in the services sector. Based on these positive developments, this wide-ranging growth is projected to continue based on agricultural sector revival, recovery in the industrial sector, and inflow of speculations in China Pakistan Economic Corridor (CPEC). Along the CPEC route, new industrial zones will open opportunities for investment to boost economic activity; however, it can also result in degradation of the environment. Industries emit toxic gases during the production process e.g. Carbon Dioxide, Sulfur Oxides, and particular matters, etc. But Carbon dioxide is considered a more important greenhouse gas. Internationally, there is a huge debate on Carbon Emissions because Carbon dioxide is a well-known greenhouse gas that is a major cause of rising temperature by emitting and absorbing thermal radiation. It is assumed that if

there were no greenhouse gas, the earth would be much cold and the average earth temperature would be -18 degrees Celsius (Qiancheng Ma, 1998).

Global Climate Risk Index (2017) reported Pakistan as the seventh most badly affected country due to climate change. World Bank has estimated a loss of Rs. 365 billion annually for the economy of Pakistan due to environmental degradation. The magnitude of these costs indicates that environmental decay is a serious concern to achieve sustainable development in the country. According to a collaborative study of IGES and the government of Pakistan, Pakistan is ranked on the list of most vulnerable cities to climate change. An assessment of NDMA revealed that there is an economic loss of 4 billion USD losses due to climate-related calamities. The total federal budget to expenditures related to the aforementioned calamities is from 5.8 to 7.6% of an annual budget. Different measures have been adopted by many countries to reduce their Carbon emissions e.g. Carbon Tax, Carbon Trading, Cap and Trade, etc. But frequently discussed and used technique is of Carbon taxation System. Carbon tax imposes on one or more greenhouse gas emissions linked with the burning of fossil fuels. Practically, such a tax is often applied to carbon contents of fossil fuels or on per ton Carbon emissions internationally.

Some neighboring countries of Pakistan e.g. China, Iran, and India also impose CO<sub>2</sub> tax policies in their country but Pakistan still has not adopted such policies in the country. Although, Pakistan is not much contributing to the world's total carbon emission like its neighboring developing countries e.g. India and China, etc. But there is a huge potential of increasing industrialization in Pakistan under CPEC Projects. Many governments have accredited eco-friendly energy sources and have strengthened their efforts in handling the several governing difficulties. The less consideration of measures adopted in countries due to poverty, poor economic conditions, absence of foreign investment, inadequate infrastructure, unavailability of capital, weak governance, etc. According to Climate change policy 2012, 5.1 (i), there is provision for introducing a carbon taxation system on the use of environmentally damaging energy generation processes from fossil fuel consumption in Pakistan. But there is no on-ground implementation of this technique having been observed. This Research is a

comprehensive study about determining the impacts of Carbon Taxation on Local Industries in Pakistan and research assesses the impact of the Carbon Taxation System on Local Industries Growth and finds out should it be applicable to Industries in Pakistan or not?

## 1.2 Problem Statement

According to the global atlas report 2016, Pakistan Ranked 31st country in carbon emissions by producing 187 Mt CO<sub>2</sub> out of the world total 35675 mt CO<sub>2</sub>. 187 Mt CO<sub>2</sub> emissions are shared by Coal 20 MT CO<sub>2</sub>, Oil 91 MtCO<sub>2</sub>, and Gas 76 Mt CO<sub>2</sub>. The reason for GHG or Carbon emissions is due to vehicles, Industry, and burning of solid waste (World Bank 2014).

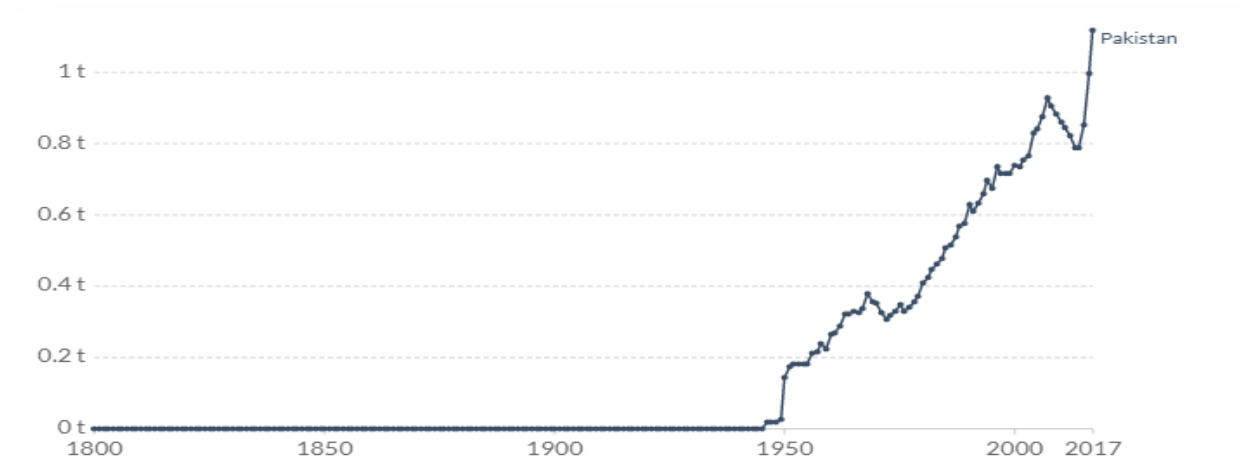


Figure 1.2 Rise in Billion ton Carbon Emission in Pakistan, Source: Global Carbon Project (CO<sub>2</sub> Information Analysis center)

Although GHG emissions in Pakistan are comparatively unassertive (2.1 t Carbon emissions per capita in 2015) but these are increasing at a rate of 6% per year with rapid economic growth. According to a collaborative study of IGES and GOP, Carbon emission could raise 1603 Mton till 2030. Internationally Carbon pricing or Carbon Taxation is considered as a solution to GHG or Carbon emissions reductions. According to UN Climate Change, about 42 national and 25 subnational territories are using carbon pricing techniques (UN Climate Change News). Different nations have developed their Carbon pricing scale for their country e.g. Canada has its

Carbon pricing scale of 1US \$/tCO<sub>2</sub> emission. Similarly developing nations e.g. India, China and Iran have also Carbon Taxation Policy. Pakistan is also deliberating the advantages of carbon pricing either through Carbon tax on greenhouse gas (GHG) emissions or through a Carbon trading system which could urge speculations and national actions on climate changes (UN Climate Change News). From 1951 to 2016, Carbon emissions are increasing at an exponential rate in Pakistan as well. Figure 1.2 shows the total sum of Carbon dioxide emissions from 1971 to 2016 is more than 4 billion tons in Pakistan. This leads to poor climatic conditions in metropolitan cities of Pakistan e.g. Smog.

Sustainability is a concept which is connected to human-controlled environmental systems since earlier civilizations. Only the resilient societies might experience local growth and developmental success by resolving the crises faced by the passage of time while others who don't resolve declined. In environmental sciences, the word sustainability means the ability of ecosystem systems to stay healthy, distinct, and with high productivity over time. This research goes in favor of sustainable development principles by contributing to reducing CO<sub>2</sub> emissions and making the environment less polluted with continuing industrial growth which helps to reduce adverse climatic action. This research links with two Sustainable development goals (Goal 11 sustainable cities and communities and goal 13 Climate Action).

### **1.3 Research Questions**

Main Question: Is there any impact of CO<sub>2</sub> taxation on local Industries Growth or not? If yes then what will its consequences, mode of implement, framework to impose with minimal effect on industries and consumers?

- Sub questions:
- Can we Import CO<sub>2</sub> Tax in Pakistan?
  - What will be the consequence of such taxation system in Pakistan?
  - What is the impact of such solution on public?



- What is level of acceptability by public and Industry?
- What Mechanisms adopt by industries in Pakistan?
- What are the measures use to control CO<sub>2</sub> emissions in Pakistan?

## 1.4 Research Objectives

**Main Objective:** To determine is there impact of CO<sub>2</sub> taxation on local Industries Growth and If yes than what will its consequences, mode of implement, framework to impose and impact of industries and consumers.

**Sub Objectives:** **Objective 1:** To assess the Chronological Mechanism of Carbon Taxation system in the world (Processes, Impacts and Parameters).

**Objective 2:** To assess the impacts of Carbon tax on Industries (in term of Productivity, Price and Location).

**Objective 3:** To explore the drivers and barriers towards implementation of Carbon Taxation.

**Objective 4:** To investigate the level of acceptability of carbon taxation by public and Industry.

**Objective 5:** To recommend strategies for effective control of Carbon Emissions from industries

## 1.6 Rational of Study

Such type of study has not been conducted in context of Pakistan. Internationally, there are many researches on Carbon Taxation but specifically its impacts on industries growth have

not been studied. So this research is very useful in our country Scenario where this type of research is a new initiative.

## **1.7 Organization of Thesis**

This Research thesis is consisting on following parts:

**Chapter 1** is introduction of thesis. This chapter provides an idea about the research, Areas which are covered in this research and a general view about all chapters and their structure. This Chapter defines the statement of problem, Research Objectives and Linkage of research with Sustainable Development Principles etc.

**Chapter 2** is literature review that covers the past researches which have done on this topic nationally and internationally, this chapter link research topic with previous researches by finding research gap.

**Chapter 3** defines the overall methodology and procedure step by step adopted for the execution of this study. The general to specific approach is adopted in order to complete the study. This chapter describes all the procedure from selection of the topic till suggestion of recommendations and compilation of the thesis document.

**Chapter 4** is results simple or derived from collected data in form of tables, figures, graphs etc. This Chapter also consists on detail discussions of results.

**Chapter 5** is Conclusion and recommendations which is generally based upon aforementioned results and discussions. Conclusion summarizes the results and policy recommendations are based on results.

## Chapter 2

### LITERATURE REVIEWS

The rapid industrial growth in developing countries leads to many social, economic, environmental, institutional and physical impacts. In order to control the harmful effects of industrialization and urbanizations strategies have been adopted in the world e.g. use of energy-efficient parks, Foreign Investment to achieve green growth strategies, Industrial Land reduction techniques, Industrial Transitions (Industrial relocation from developed to 3<sup>rd</sup> world countries), Short term and long term monitoring plans, Carbon Pricing and Carbon Taxation system and use of large scale field atmospheric field management system in the world etc. Carbon taxation system is used as a tool to control the carbon emissions in the world. Many thematic areas and parameter are listed in table 1 in annexure.

#### 2.1 Impacts of Industrial Growth

Industrial growth rate is increasing rapidly in developing countries which led to many Social, Economic and Environmental Concerns by enhancing the issues e.g. air pollution. (Hongbo Fu, Jianmin Chen, 2017).

##### 2.1.1 Economic Impacts:

According to Law of thermodynamics, any productive process always involves waste. So it is impossible to stop pollution in any production process. But economically, expensive cleaner manufacturing is the major cause of occurrence of pollution. (Helfand et al., 2003). Industrial growth has many positive effects on Economy of a country by increasing GDP, FDI, Average annual earning, total financial revenue, employment rate and growth rate. Similarly Industrial growth leads to low dependency ratio. Industrial growth has direct positive effects as well as indirect contemporary positive effects e.g. impacts on price changes of base metals (Tian Wanga, Cangfeng Wangb, 2017). Financial development in a country leads to more industrial

growth especially on sectors which depends on external liquid (Ho-Chuan et al, 2014). Industrial growth is a business activity (Yiannis Kouropalatisa et al, 2018). Its focus is on money making and profit seeking, different nations adopt different strategies for their industrial growth e.g. Pham Tien Thanh, Katsuhiko Saitob, Pham Bao Duongc, (2019), depicted that microcredit is also considered an applicable strategy at both micro and macro levels in vietnam.

### **2.1.2 Environmental Impacts:**

Industrial growth has short term positive economic impacts and it has a short and long term adverse environmental impacts. Industrial units emit toxic waste which is harmful for environment. Environmental damage from industrial pollution is a large as earth's average temperature rises due to GHG emissions. Theoretical solution for this loss is provided in form of socially optimum level of pollution but practically it is difficult to achieve due to difficulties in monitoring and enforcement of environmental regulations. Practically, the cost estimation of pollution control is very difficult because it does not only involve the installation of pollutant reduction technologies as purifiers, but also encompasses many other selections e.g. modifying the production process, fuel substitutions, changing product specifications etc. (Cristian Mardones, 2019). Industrial transformations effect the changes in urban spatial structure and optimum allocation of land. (Dimitrios Pappas, Konstantinos J. Chalvatzis, 2017). Environmental damages of industrial pollution are both at small and large scale. For example, Industrial activities affected the size dependency of the concentration of certain elements (Pb, Zn, Cu, Cd, and Cr) in the street dust, but not in the soil (Hosseini Khademi et al, 2018). Similarly the industrial production mechanism and methods of energy or fuel consumption have substantial positive impact on the Carbon emissions both short and long terms. Carbon emissions effect industrial growth, as there is significant influence of industrial structure changes on growing carbon emissions (Pingdan Zhanga et al, 2018).

### **2.1.3 Social Impacts:**

Health is third Sustainable development goal and has major impacts on all walks of life. Many national and international organizations are contributing to achieve this sustainable development goal. Pollution is considered one of the major causes of poor health conditions. According to a recent report of the World Health Organization (WHO), there are nearly 7 million early deaths observed in 2012 caused by air pollution, indicating a higher pollution risk compared to previous estimations (Hongbo Fu, Jianmin Chen, 2017). The total environmental losses from air pollution are not limited to only premature deaths but also include many other parameters including increasing rates of severe diseases, restricted daily activities, low productivity, agriculture and forestry damages, and destruction of the ecosystem. Moreover, the pecuniary quantification of the damages associated with air pollution is very difficult to calculate due to many technical, ethical, and political concerns (Helfand et al., 2003).

Increasing industrial growth leads to poor conditions of labor. As Chinese research shows, industrial growth has a positive impact on workplace fatalities (Hongbin LI, Lingsheng MENG, Wenqing PAN, 2016). Human capital is a sensitive factor of production. Towns near industrial pollutant sources are more vulnerable to severe diseases (e.g. cancer and respiratory diseases) due to increasing amounts of carcinogens in the air (Pablo Fernández, et al., 2017). In developing countries, poor health might lead to poor well-being because the low-income class spends a huge proportion of their monthly salary on health problems. A case study of Mumbai shows that 29% of monthly income is spent on health issues. (Anjali Srivastava, Rakesh Kumar, 2002).

#### **2.1.4 Institutional and physical Impacts:**

Infrastructure is a significant determinant to deal with the development challenges of current world: social security, urbanization, climate change adaptation and mitigations. Except if and until nations fabricate a comprehensive development based infrastructure, they will find it is harder to adapt to the difficulties. For this purpose assistance of both public and private partnership is needed. Industrial growth has its impact on on-going institutional policies, increasing level of Carbon emissions leads to change in policies to achieve sustainable urban development. Similarly Industrial growth put great pressure on existing routes, rail lines, air transport and internet servers. It leads to increase in demand of existing physical infrastructure by increasing electric power and fuel consumption. Shehnaz, Kaleem Anwar Mir and Tayyaba Idrees, (2018) examine the impact of infrastructure and institutional quality on industrial growth of Pakistan (1984 – 2012) by employing ARDL (Auto Regressive Distributive Lag) to determine the combine and individual impact of infrastructure and institutional quality on industrial growth of Pakistan by two diverse proxies. And results show that the Infrastructure and institutional quality is positively related to industrial growth.

Similarly Muhammad Salman , Xingle Long, Lamini Dauda and Claudia Nyarko Mensah, (2019) explore the impact of institutional quality on Carbon emissions growth interconnection of a panel of three East Asian countries (1990 to 2016) by using incorporated energy consumption and trade openness as important indicators in the model and results indicate the co integration of variable along with positive significant interaction between carbon emission and institutional quality and institutional quality simulate the economic and industrial growth.

## **2.2 Strategies to Control Industrial Pollution in the World**

Industrialization and urbanization, both are increasing rapidly in developing countries which led to many Social, Economic and Environmental Concerns by enhancing the issues e.g. air pollution. All Issues of developing nations are of similar Nature which previously experienced by the developed nations (Hongbo Fu, Jianmin Chen, 2017). Historical examples of

west (e.g. London fog and loss angelus smog) reveal that their government exactly focuses on formations or regulations and their enforcement (Hongbo Fu, Jianmin Chen, 2017). Similarly an Industrial transition from first world countries to third world countries results a hazardous global emission increase that neutralized by implementation of advance green energy policies. (Dimitrios Pappas, Konstantinos J. Chalvatzis, 2017). Following are few strategies which are using across world;

### **2.2.1 Eco- Industrial Parks:**

In Eco industrial parks, less waste produces during business activities in local communities and it helps to attain sustainable development by improving environment quality and increasing economic development. e.g. An industrial park located in Kalundbory in Denmark. Yanqiu Wang, Xueting Ye, Zhiwei Zhu, Yi Wang, (2019) briefly explained the introduction of industrial ecosystem in 1989 by Frosch and Gallopoulos in Scientific American. From that point forward it has been considered as one of the significant answers for accomplish useful utilization of waste and side-effects to limit ecological debasement. A few organizations from various ventures were occupied with sharing assets like actual trade of materials, energy, water, and results. This business development was portrayed as Industrial Symbiosis (IS) by Chertow (2000). The organizations inserted with advantageous interaction connections structure modern advantageous interaction organizations (ISNs), which was characterized as an Eco-Industrial Park (EIP) in the writing. EIP has emerged with the consideration on successfully sharing resources similarly to typical organic framework in journey for lessened regular impact and increased monetary benefits. As of late, the EIP development projects have been done both in developing and developed countries worldwide including USA , Australia, Canada, Finland, India, Korea and and China.

Similarly in China researches are focusing on transformation of resource base cities by strengthening networks and enhancing energy efficiency in industrial parks which can increase the sustainability of the industrial parks (Yanqiu Wang, Xueting Ye, Zhiwei Zhu, Yi Wang, 2019). Sha Long, Lin Zhao, Hongbo Liua , Jingchen Li, Xia Zhou, Yunfeng Liu , Zhi Qiao ,Yingxin Zhao , Yongkui Yang,(2019), highlighted that water pollution control in industrial parks is extremely

challenging. They used a Monte Carlo model to simulate the treatment. Subsequently, characteristic values, including the extent of pollutant reduction, concentration of pollutants in the effluent, and operation costs, were predicted under optimal operating conditions of the wastewater treatment system. The established model was applied to industrial park A in the Tianjin Economic-Technological Development Area in China.

### **2.2.2 Foreign Investment:**

The effect of Foreign Development Investment (FDI) on Industrial Pollution can be positive or negative (Binyam af Et al, 2019), literature is dominated by adverse impacts but there are possibilities of positive impacts on environment if Investment will made on green energy technologies (Binyam af Et al, 2019). For example researches shows, In Korea, foreign investments are reputed as a highly probable way to implement the green growth strategies and increasing development balancing with the adverse impacts on economic growth and air quality reduction. ( Erik Hillea, Muhammad Shahbaz,Imad Moosa, 2019).

### **2.2.3 Industrial land reduction:**

Industrial land reduction technique may helpful to reduce public managerial costs and decreases the adverse environmental impacts by reducing pollution sources. Specifically, Zhengfeng Zhanga, Jing Liub, Xiaokun Guc (2019), elaborates rural industrial land reduction techniques as a theoretical reference for rural renewal which is getting popular in different regions of china, that was on the basis of the "negative growth of construction land", Shanghai has given strategies as of late about modern land decrease past the metropolitan Development Boundary (UDB), to get extra metropolitan development land quantity and control the muddled spread of rustic development land.

### **2.2.4 Urbanization:**

Boqiang Lin, Bin Xu, (2018) indicate that Carbon dioxide is one of the primary wellsprings of an unnatural weather change, rising ocean levels, and successive flare-ups of outrageous climate. China is presently one of the biggest energy shopper and CO<sub>2</sub> producers in the world. As one of China's financial focuses, Shanghai city has an ideal modern framework with enormous mechanical scale. The mechanical area is an energy and emission intensive



industry, which contributes the huge piece of CO<sub>2</sub> outflows in Shanghai city. Hence, an in depth examination of the fundamental main thrusts of CO<sub>2</sub> discharges in the modern area is fundamental to diminish CO<sub>2</sub> emanations in the city. This examination utilizes Vector Autoregressive model to dissect the primary elements causing the expansion in CO<sub>2</sub> outflows in the modern area. The outcomes show that financial development prompts an increment in CO<sub>2</sub> outflows in the short run, yet is helpful for decreasing CO<sub>2</sub> emanations over the long haul, because of the distinctions in fixed asset speculation and fare exchange. Energy utilization structure prompts a developing CO<sub>2</sub> outflows temporarily, and is useful to relieve CO<sub>2</sub> emanations in the long haul, attributable to the steady improvement of energy utilization structure. Be that as it may, urbanization assists with lessening CO<sub>2</sub> outflows temporarily, however prompts an expansion in CO<sub>2</sub> emanations in the long haul, as a result of metropolitan land and foundation development ventures just as vehicle use. Energy effectiveness prompts an increment in CO<sub>2</sub> discharges both in the short and since a long time ago run since the scale impact surpasses the specialized impact. Mechanical construction creates a beneficial outcome in the short run, yet the effect is step by step narrowing over the long haul. Urbanization is a very short term way to reduce Carbon emissions and leads to increasing Carbon emissions due to increasing vehicular and industrial activities (Boqiang Lin a, Bin Xu,2018).

### **2.2.5 Short and long term monitoring plan**

The steady economic growth in few coming years leads to a situation with more energy consumption, increasing production and Vehicular pollution which will lead to multiple pollutant emissions in developing countries. Therefore short to long term monitoring plans are strongly encouraged in developing nations (Hongbo Fu, Jianmin Chen, 2017). Hongbo Fu, Jianmin Chen (2017), elaborated the challenges faced due to severe haze fog in china and also indicated the model which highlight the effectiveness of short term and long term monitoring plans.

## **2.2.6 Carbon Pricing and Carbon Taxation**

On the basis of fourth evaluation report of Intergovernmental panel on climate change (IPCC), in 2004 carbon dioxide is estimated about 76% of the overall Green House Gas emissions and 56.6% emissions are caused by combustion of fossil fuel. It became a challenge of climate change, therefore low carbon development and carbon emissions reduction is unavoidable. Several policy options have been adopted worldwide for Carbon emission reduction including Carbon trading, carbon taxation, emission taxation, energy tax etc. whereas, Economist and international originations recommended Carbon tax as a more cost effective method of carbon emissions reduction (Boqiang Lin, XuehuiLi, 2011). A carbon tax balances the social expense of carbon which is the insignificant expense of the effects initiated by radiating one additional huge load of GHG or CO<sub>2</sub> identical outflows at a point in factor times (Jordan T wilkerson et al, 2015). Coordinated Evaluation Models (IAM) gauges the Social expense of carbon and foresee the ideal situation for count of monitory misfortunes by fuel uphold. The Fossil fuel byproducts by fuel source are increased by social expense of carbon and ideal duty rate can be gotten (Jordan T wilkerson et al, 2015). So far the explores show that carbon burdens effectively lessen GHG outflows. Normally financial experts contend that carbon tax is the more successful approach to control environmental change externalities with low hostile monetary impacts. In this way, in 2019, in excess of 40 nations of the world have executed carbon assessments and in excess of 100 urban communities have vowed to achieving net zero worldwide fossil fuel byproducts till 2050.

## **2.2.7 Field measurements across the world**

During past few decades, some rigorous field movements have been started to solve air pollution issues or to mitigate causes of global warming e.g. MILAGRO (Megacity Initiative Local and Global Research Observations) in Mexico and ABC-Asia (Atmospheric Brown Cloud Asia) in Asia etc. (Hongbo Fu, Jianmin Chen, 2017).

### **2.2.8 An example of Chinese Efforts:**

In Last few decades, china is paying a substantial amount for widespread industrial growth with excessive power utilization and increasing pollution. Polluted environment is the most ruinous output of industrial activities which intimidates human survival and environment sustainability. The issues regarding balancing the environmental stability and growing economic development are much highlighted in china. And China needs to maintain substantial economic development with pollution reduction strategies which has become a major current challenge. Following are few policy measures of china's policy chain which was articulated by Chinese government in recent years.

- In order to ensure the environmental protection in china, a first inclusive regulation with several provisions of environmental protection and improvements was formulated in 1973.
- During 1980s, Chinese government use pollution charge system as a pollution control strategy by amalgamation of Chinese pollution governance policies and the economic development mechanism (Chen et al., 2017).
- In 2012, a principal national development strategy has established which consist on provision for an environmental development.
- Apart from formulation of Environmental protection law, China is perpetually going into new tactics of environmental governance, e.g. establishment of biggest emission trading system of the world (Zheng et al., 2019).
- China's new governance system incorporates trade, social system and community participation as well (Tu et al., 2018). Similarly environmental governance in china has also improved in form of a strong network overwhelming local and regional boundaries (Jiang et al., 2017).

- In 2012 (Twelfth Five-Year Plan), targets (Carbon intensity target, environment governance, carbon trading, energy restriction) have implemented by NGOs and international think tanks. By continuous efforts of promoting environmental protection, China has accomplished with outstanding results in this regard (Su, 2018). All above mentioned effects are also steadily acknowledged by the international organizations. China contributed well in support of global climate change (Yi Su, Yue-qi Yu, 2019).

## **2.3 Carbon Tax**

### **2.3.1 Introduction to concept**

A carbon tax is a type of contamination tax which is regularly assembled with two other monetary approach instruments named as tradable contamination credits and subsidies. Carbon tax offers a potential financially savvy method for decrease GHG outflows. As per a monetary point of view, carbon tax is a sort of Pigovian charge (which are demanded on market exercises that produce negative externalities) and help to decrease the issue of producers of GHGs (C. Pigou ,1920). To forestall it to be backward assessment, carbon charge incomes can be used to inspire the low-pay gatherings. The fundamental thought of any GHG tax assessment depends on this Pigouvian tax that plans to embrace the expense of the negative externalities into the market cost to accomplish a decrease in GHG emanations and henceforth to moderate environmental change impacts. Probably the first recommendation of a carbon tax was proposed by a previous PM of Uk Ridley Nicholas and was bounced back in the Division of Climate's Pearce report as a technique for putting a cost on natural advantages and misfortunes (Qian Wang ei al, 2016).Carbon tax is from one of potential strategies for handling GHG discharges. A carbon tax is a type of duty which straightforwardly collected on the carbon substance of fills including transport and energy area. It is a type of carbon pricing like carbon trading. The Pace of Carbon tax is by and large put across in money related terms per unit of fossil fuel byproducts for example on USD per ton carbon emissions premise. Carbon tax is utilized as an instrument to control GHG outflows (CO<sub>2</sub> is a significant Nursery gas).It is likewise

used to indicate as a carbon dioxide identical expense, which can be put on a GHG or mix of GHG, emanations by monetary/modern areas. It is a duty like other comparable assessments for example emanation tax, energy tax, oil/hydrocarbons tax and so forth.

A carbon tax balances the social expense of carbon which is the insignificant expense of the effects initiated by radiating one additional huge load of GHG or CO<sub>2</sub> identical outflows at a point in factor times (Jordan T wilkerson et al, 2015). Coordinated Evaluation Models (IAM) gauges the Social expense of carbon and foresee the ideal situation for count of monetary misfortunes by fuel uphold. The Fossil fuel byproducts by fuel source are increased by social expense of carbon and ideal duty rate can be gotten (Jordan T wilkerson et al, 2015). So far the explores show that carbon burdens effectively lessen GHG outflows. Normally financial experts contend that carbon tax is the more successful approach to control environmental change externalities with low hostile monetary impacts. In this way, in 2019, in excess of 40 nations of the world have executed carbon assessments and in excess of 100 urban communities have vowed to achieving net zero worldwide fossil fuel byproducts till 2050.

## **2.3.2 Chronological History of Carbon tax**

### **2.3.2.1 Industrial Revolution**

Industrial Revolution (1760-1840) was a progress from customary to new assembling measures which was arisen in Europe and US exchange and business was the significant target of mechanical transformation. From mid-eighteenth century, UK was the world's driving country in term of business and exchange, controlling the exchange through settlements in North America and Caribbean and by East India Organization in Sub-mainland. Developing free enterprise economy was significant reason for modern upheaval. Because of rise of free enterprise economy, Gross domestic product per capita was consistent before Modern insurgency. However, the Industrial revolution promoted the economic growth which led to a structural change (from Agriculture revolution to Industrial revolution). Historians thought that the Agricultural revolution a primary root causes of Industrial revolution , for the reason that

the growing agriculture output nourish industries for their effective production, however the Agriculture revolution could not safeguard food supply usefully.

### **2.3.2.2 Impacts of Industrial revolution**

#### **a) Technological Innovations and uplifting living standard:**

Important technological development includes steam power ,Iron production, Textiles, Invention of Machine Tools , cement, gas lightening, paper machine, mining, Agriculture and chemical. Households were consumers of all industrial products; therefore their living standards were uplifted (Mabel C. Buer, 2006).

#### **b) Population growth and increase in per capital income**

Industrial revolution changed the way of life and day to day environment of individuals. Extraordinary ascent in pace of populace development was seen in this period. Public was profited by tumbling costs for fabrics and family things. It was the primary time in history where there was a momentary ascent in populace just as in per capita pay. This was an uncommon ascent in the populace development rate and expectations for everyday comforts.

#### **c) Rising Literacy rate**

The making of the paper machine and the utilization of steam power in printing conveyed a tremendous increment in newspaper and book publications, which become a major cause in rising literacy rate.

#### **d) Increasing women Participation**

Aside from previously mentioned advancement, ladies interest being developed was a more sure part of mechanical upset. It is discussed that private enterprise made the conditions for ladies' freedom. Tilly and Scott have stressed the progression in the status of ladies, discovering three phases in English history.

1. **Pre-modern era:** In this period creation was generally for homegrown use and ladies produce numerous requirements of the families.
2. **Family compensation economy:** In this second time of early industrialization, the entire family relied upon the mutual pay of its individuals, containing spouse, wife and more seasoned kids.
3. **Family purchaser economy:** It was third and present day age in which the family is the site of usage, and ladies are working oftentimes in retail and administrative responsibilities to help rising norms and expanding uses.

#### **e) Reduce infant mortality**

Child mortality rate decreased dramatically (Mortality rate of less than five year of age decreased from 74.5% in 1730–1749 to 31.8% in 1810–1829 in London.

#### **f) Increasing child labor**

"There is work that benefits youngsters, and there is work that brings benefit just to managers. The object of utilizing youngsters isn't to prepare them, however to get high benefits from their work." (Lewis Hine, 1908). Government and administrative bodies had made an honest effort to control child work by laws and guidelines yet some production line proprietors restricted by contending that they were supporting the helpless families by giving their youngsters cash to purchase food to forestall craving and others ones just think that it's a best wellspring of modest work. During 1833-1844, the principal generally speaking laws against youngster work (the factory Acts) were passed in Joined realm which expressed that children

under nine years were not permitted to work, and no kid was allowed to work around evening time hours, and the working long periods of under age of 18 was restricted to twelve hours. Plant examiners were delegated to regulate the implementation of the law however their deficiencies made it troublesome. The Mechanical Insurgency consolidated work into plants and production lines, which coordinated the worker's guilds to help the interests of working individuals.

### **g) Urbanization**

Since late eighteenth century, Mechanical development prompted huge urbanization and the ascent of new urban areas (first in Europe and afterward in different locales), which turned into a chance for travelers from provincial networks into metropolitan territories. In eighteenth century, just 3% of the total populace lived in urban communities that are immaterial when contrasted with half in 21st century .for example Manchester had a populace of 10,000 out of 1717; however by 1911 it had populace almost 2.3 million. Moreover, the Industrial revolution had changed the life style and living condition of people. There were an exceptional rise in population growth rate and improved living standards and reduce Child mortality rate.

On the Other hand, there was a rapid population growth in new industrial cities as well as in service centers. Large contracting firms dominated and solve the issue of financing and constructing new towns and cities. Similarly, trend of rental houses prevailed in this tenure. People started moving to these industrial cities due to availability of employment and there was not enough money and space to build houses for every family, therefore, the low income people start living in overcrowded areas or slums with inadequate facilities of water, sanitation and public health etc. Industrial waste was contaminating the water resources and gave bad order. Death rate got increase due to child mortality and diseases e.g. tuberculosis and cholera among young adults in these overcrowded areas. The condition of working class became miserable because they were living in shanty towns with dirt floors. Population density was much higher due to rapid increase in population. But the living condition of middle class (businessman, foreman, clerks, and engineers) was quite better in this tenure. Conditions



remain same until the enforcement of byelaws. In 19<sup>th</sup> century public health Act provided solid frame work for regulating things. This act led to byelaws which help to control the water, sanitation and public health facilities.

#### **h) Adverse Environmental Impact**

There were noticed expanding levels of smoke contamination in the climate during the industrial revolution. The development of incredible production lines and the concurrent monstrous development in coal utilization turned into a main driver of expanding level of air contamination in mechanical focuses. Soon after 1900, the bulk of industrial effluent added with increasing untreated human waste. Similarly, the manufactured gas industry (Started in Britain 1812–1820) generated highly poisonous discharge which contaminated the water bodies (Leislle Tomory, 2012).

#### **i) Poor health conditions**

Towns near industrial pollutant sources are more vulnerable to severe diseases (e.g. Cancer and respiratory diseases) due to increasing amount of smoke in air.

#### **j) Increase in oil base Economy**

Oil base Economy and Climate change are intertwined. Urban Sprawl and low density development can be effect of oil base economy and negative environmental impact.

### **2.3.2.3 Environmental movements**

The Ecological developments were begun in the reaction to smoke contamination during modern Insurgency. The development of various production lines and the quick development in fuel (coal) utilization gave raise the degree of air contamination in and encompassing the mechanical zones. After 1900, the volume of substance gushing in water bodies got rising and accordingly the cutting edge ecological law with name of England antacid act came in front, which was passed in 1863. To direct the harmful air contamination, salt overseers were delegated. With entry of time force of soluble base overseers were growing in

salt request 1958. The gas organizations were more than once sued in aggravation claims. They typically adjusted the most noticeably terrible practices. The City of London over and over again prosecuted gas organizations during the 1820s for contaminating the oceanic life. At last, Parliament composed an organization sanctions to standardize the hurtfulness (Leislle Tomory, 2012). After 1890, the modern urban communities nearby specialists and reformers started to lead the pack in distinguishing ecological hardship and contamination, and acquainting grass-roots developments with specify and succeed changes with greatest need given to water and air contamination.

In additions, the Coal Smoke Decrease Society (1898) was molded in England known as primogenital natural NGO (Clapp B.W. ,1994). In spite of the fact that there were crude enactment named as General Wellbeing Act 1875 which required all boilers and firesides to consume their own smoke likewise arrangements against plants which radiated enormous measures of dark smoke. The arrangements of this law were reached out in 1926 with the Smoke Reduction Act to incorporate different discharges, for example sediment, dirty, debris particles and to allow nearby specialists to uphold their own guidelines (Clapp B.W. ,1994).

#### **2.3.2.4 Emergence of Sustainability Concept In 1980s**

The idea of manageability was related with human overwhelmed biological frameworks from the soonest civilizations to the present. Any general public may go through a neighborhood development and reformist accomplishment, which might be oblige emergencies that were either fixed (bring about manageability) or not fixed (lead to decay). In biology, the word supportability outlines a capacity of organic frameworks to stay solid, profitable and different with entry of time. Enduring a sound backwoods or wetlands are instances of reasonable natural frameworks.

Since 1980s, Maintainability as a term has been determined more in the importance of human manageability on earth which drives us to the impression of feasible turn of events. On Walk 20, 1987, it was characterized by the Brundtland Commission of the Unified Countries as follows: "Feasible advancement is improvement that addresses the issues of the present

without bargaining the capacity of people in the future to address their own issues." Brundtland Report is otherwise called our basic future distributed on October 1987 by the Assembled Countries. In setting of the turn of events and climate emergencies looked by world in 1980s, all public and global political and monetary bodies can't conquer the pursuit of economic improvement without following prerequisites that are more in nature of objectives in accomplishment of maintainable turn of events (Our Basic Future, Section 2: Towards Practical Turn of events).

- a) A political framework that shields compelling public support in dynamic cycle
- b) A financial framework which empower excesses and specialized information on a confidence and supported premise
- c) A social framework that specify the answers for the issues emerging because of discordant turn of events.
- d) A creation framework which respects the commitment to safeguard the climate structure advancement.
- e) A mechanical framework that can look continually for new arrangements.
- f) A worldwide framework that advances economical examples for business.
- g) A managerial framework that is versatile and has the limit with respect to self-endorsement.

Ecological financial specialists are on the side of solid manageability discusses that regular capital for example clean air can't be Supportable turn of events. At the point when these are fill in for by different types of capital and ought to consequently not be permitted to decrease over the long run (Jacobus A. Du, 2007)

### **2.3.2.5 Paris Agreement**

The Paris Agreement inside the United Nations framework convention on climate change (UNFCCC), manages GHG outflows relief, variation, and money. It was endorsed in 2016 and again in 2020 having 189 nations are its signatories. The drawn out temperature objective of this understanding is to keep the expansion in worldwide normal temperature to well under

2 °C above pre-modern levels; and to rehearse the endeavors to restrict the increment to 1.5 °C temperature, perceiving that this would considerably direct the dangers and effects of climate change. This ought to be done to accomplish a harmony between outflows by sources and expulsions by sinks of GHGs in the second half of the 21st century. It likewise expects to alleviate the unfavorable effects of climate change, and make consistent account streams towards low GHG discharges and environment strong turn of events. Under this Arrangement, every nation should decide, plan, and routinely report on the commitment that it embraces to moderate an Earth-wide temperature boost.

The way toward making an interpretation of the Paris agreement into public plans and usage has begun. A model is the least develop countries, Renewable energy and energy efficiency initiative for sustainable development, known as LDC REEEI, which is set to carry feasible energy to energy-starved individuals in Least develop countries, to accomplish the manageable improvement objectives. Based on investigation from the Intergovernmental panel on climate change (IPCC) a "carbon financial plan" to restrict a dangerous atmospheric deviation to 1.5 °C was assessed to be 2.25 trillion ton of in general transmitted carbon dioxide from the time frame since 1870.

#### **2.3.2.6 Appropriation of Carbon taxation System**

Countries accepted carbon charge appraisal structure to meet the goal of low petroleum derivative side-effects. Carbon charge has existed worldwide for very nearly 20 years , and countries as of now getting carbon charge fuse Denmark, Finland, the Netherland, Norway, Sweden, NewZealand, Switzerland, Italy, Canada and Colorado State in the US, etc The carbon charge was as a matter of first importance dispatched in Finland in 1990, and it was applied to gas, diesel, light fuel and heavy fuel oil, stream fuel, aeronautics gas, coal and oil gas. In 1994, Finland secluded the fuel charge in to energy-mixed obligation and carbon charge. In 1990, the Netherlands brought carbon charge into its regular appraisal structure. Considering the responses on the evacuation of carbon charge livelihoods, the country later turned the carbon charge in to energy charge, which was correspondingly isolated into energy mixed cost and carbon charge. From the start, express powers and regions were barred from carbon charge.

Latterly as the Northern European force market opened, some energy-raised endeavors were pardoned from the evaluations well. Norway required carbon charge on petroleum, mineral fuel and combustible gas since 1991 with the rates subject to the invigorate carbon content. In 1992, the cost was contacted cover part of coal and coke, which were not used expansion and light penetrated earth creation. The cost isn't demanded on marine transportation, flying and electric regions and is cut down the center for the squash and paper regions. Denmark passed a suggestion to correct a carbon charge in 1991 and set up it as a customary event in 1992. This charge covered combustible gas, petroleum and other mineral empowers, beside biomass fuel. The regions recorded in increasing solicitation of obligation rates are transportation, power use for business industry and family, light and strong endeavors. In 1991, Sweden began a carbon obligation of \$44.37(250SEK) per metric ton CO<sub>2</sub>, which covered all fuel oils.

At the same time, the speed of the current energy charge was decreased. Contemplating power of endeavors, some high energy consuming organizations, for instance, mining industry business nursery industry, squash and paper creation industry, delivering industry and electric power industry are exculpated from the carbon charge. All the European countries referred to above began carbon charge some place in the scope of 1990 and 1992 (Boqiang Lin, XuehuiLi b, 2011).

### **2.3.3 Carbon taxation design/System**

When carbon tax design is considered, following are questions come in front:

- Who should pay the Carbon tax?
- Who shall exempt from Carbon tax?
- What should be the tax rate?
- When the Carbon tax should impose?
- Where should the tax revenue be used (also called preferential policy design)?
- What is preferable mechanism to enforce the tax?

### **2.3.3.1 Contributor of Carbon Emissions**

Households, firms and individuals are major contributors of Carbon emissions (G. Allan, 2014). Emission reductions in the industrial sector have become more considerable when the tax has applied to industrial units but detailed study is needed to determine its long-term impacts especially in residential and commercial sectors (Steven Nadel, 2016).

### **2.3.3.2 Taxpayers**

From the practical insight of nations it can see that the plan of a carbon tax framework changes from country to country. When all is said in done, the citizens are endeavors and family units, yet sometimes particular sorts of families and undertakings can be excluded from an immediate duty charged. The assessment contains petroleum derivatives in both essential and auxiliary fuel sources, albeit most investigations recommend just burdening essential energy to maintain a strategic distance from a twofold charge. There frequently exist upstream or downstream alternatives in the energy chain to execute the expense (Qian Wang et al, 2016).

### **2.3.3.3 Tax Rate**

Fossil fuel byproducts for the most part are relying on the carbon content created by utilization of petroleum products. The connection between petroleum derivative consuming and fossil fuel byproducts is a serious. Fossil fuel byproducts are a result of petroleum product start. These worries recommend that any strategy pointed toward decreasing the impact of nursery impact should restrict the utilization of non-renewable energy sources. (Lawrence H. Goulder, 1992).

The duty rates contrast among nations for instance, in 2015, it goes from an under \$1/tCO<sub>2</sub> in Mexico and Poland to a high expense pace of \$130/t CO<sub>2</sub> in Sweden. These depend on political possibility, or dependent on the negligible cut expense of carbon, or just by spending necessities (Qian Wang et al, 2016). Following table 2.3 shows pace of Carbon charge utilized around the globe (Steven Nadel, 2016).

**Table 2.3.3****Adoption of Carbon taxation system in the world (Tax rate, Sector Covered and percentage coverage rate of GHG)**

<b>Country</b>	<b>Adoption Year</b>	<b>Tax Rate (US Dollars /tCO<sub>2</sub>e)</b>	<b>Sectors covered</b>	<b>Coverage Rate (%age of GHG)</b>
Australia	2012	20	Emissions from electricity generation, transport and industrial process	NA
Boulder Colorado	2007	12-13	Purchase of Electricity except wind electricity	NA
British columbia	2008	25	Purchase and use of fuel	70
Chile	2014	5	Emissions from power sector	55
Costarica	1997	3.5	Hydrocarbons and fossil fuels	85
Denmark	1992	31	Consumption of fossil fuel with exemptions	45
Fineland	1990	40	Heat, electricity, transportation and heating fuel	15
France	2014	8	Fossil fuel products, based on carbon dioxide contents	35
Iceland	2010	10	Imports on liquid fossil fuel	50

Ireland	2010	23	Fossil fuel not covered by EU-ETS	40
Japan	2012	2	Fossil fuel by CO <sub>2</sub> Contents	70
Mexico	2014	1-4	Fossil fuel sales and imports	40
Netherland	1990	74	Natural gas, Electricity, Diesel, and gasoline	NA
Norway	1991	4-69	Mineral Oil, Gasoline and Natural gas	50
Quebec	2007	3	Fossil fuel	NA
South Africa	2016	10	Emissions from fuel combustions and non-energy industrial processes	80
Sweden	1991	168	Fossil fuel for heating and motor fuels	25
Switzerland	2008	68	Fossil fuel not used for energy or covered by EU-ETS	30
UK	2001	16	Fossil fuel used to generate electricity	25

(Source: Steven Nadel, American Council for an Energy-Efficient Economy report 2016)



#### **2.3.3.4 Approaches for implementation of Carbon Taxation**

In principle, the simplest approach for implementation of carbon tax is government imposition of a carbon tax (Aldy and Stavins, 2012). From the current acts of carbon tax collection we locate that the presentation of a carbon tax is normally joined by favored strategies. For instance, Norway forced expense on the paper business at a half rate and absolved delivery industry. Essentially, Sweden expanded the assessment on energy items and decreased the annual expense rate. Then Sweden set the carbon tax rate for the creation areas just 25% of pace of family area (Qian Wang et al, 2016).

#### **2.3.3.5 Subsidies**

As Carbon tax is regressive in nature therefore measures are adopted to progressive for even more vulnerable sectors. Provision of subsidies by government is an effective tool in order make it more progressive for all income groups e.g. Denmark's energy areas could appreciate a lower charge rates with obligation to diminish outflows. Cross country the entirety of the carbon tax incomes paid by every area and reused back to the individual area as work appropriations or energy saving venture (Qian Wang et al, 2016).

#### **2.3.3.6 Methods to alleviate adverse effects of Carbon Tax**

To mitigate the expected unfriendly distributional impact of a carbon tax following two strategies can be utilized. These two methodologies are some of the time joined to enhance one another and to accomplish charge biasedness, for example to keep the public authority share the equivalent (Qian Wang et al, 2016).

##### **1. Tax exclusions:**

It is an ex-risk approach, to diminish the weakest gatherings by low duty rates or assessment exceptions.

## 2. Tax Compensations

It is an ex-post approach, through which the compensating groups are facilitated through other distortionary tax reduction or by increasing transfer payments.

### 2.3.3.7 Transmission Mechanism of Carbon Tax

According to Qian Wang et al, (2016), when carbon tax imposed on energy sector then increased prices are faced by production sector and households. In order to mitigate the effect of this increasing prices government apart from collecting the tax also provide subsidy to both household and production sector. Thus the increasing prices can be adjusted by changing labor remuneration and capital income by production sector and through corporate income tax adjusted transfer payments to enterprises.

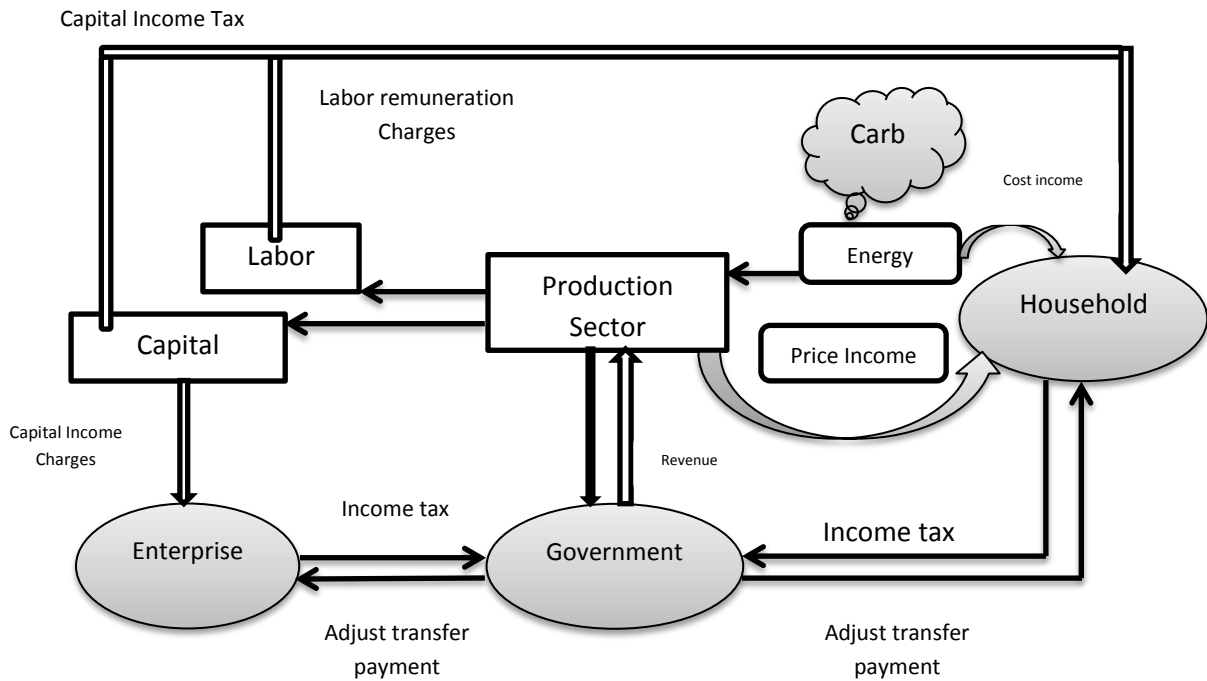


Figure 2.3 Transmission Mechanism of Carbon Tax

### **2.3.3.8 Recycle form of Tax Revenue**

Carbon tax sum is straightforwardly reused to families either through a singular amount or direct exchanges or appropriations which could assist with changing over it into a reformist carbon tax. Nonetheless, a few writers likewise write in this way it can counterbalancing the negative effect on Gross domestic product development and work, subsequently a compromise among proficiency and reasonableness frequently exists in planning the utilization of carbon charge incomes. A boundless expense configuration may improve in thinking both of these issues at same time. For example, by applying carbon tax income to limit the backhanded expense rate while developing public exchange installments to weak family units, pay disparities can be tight down and decrease the negative effects on the financial development. Notwithstanding, the public authority's regulatory expenses can be increments when actualizing such a carbon tax by and by. It is difficult to devise a for the most part best carbon tax plan, yet one practicable strategy for the public authority is first pick an inclination configuration dependent on its own social circumstance and strategy needs and afterward to change the approach configuration as indicated by its current exhibitions. (Qian Wang et al, 2016)

## **2.4 Impact of Carbon Tax**

### **2.4.1 Impact on Global Warming and Climate Change**

Carbon dioxide is from one of warmth catching ozone depleting substances produced by human exercises, and there is logical agreement on human created ozone harming substance discharges are the essential driver of an unnatural weather change. Around the world, 27 billion ton of carbon dioxide is created by human movement every year. Carbon charge is considered as a dependable arrangement accessible to governments to lessen Green House Gas outflows. Exploration shows that carbon burdens adequately lessen ozone harming substance discharges. There is overpowering understanding among financial specialists that carbon charges are the most proficient and viable approach to control environmental change, with the most un-

unfavorable consequences for the economy. Business analysts like to contend, about environmental tax as much as whatever else. In any case, on the greatest issue of all they gesture in arrangement, whatever their political influence. The most ideal approach to handle environmental change, they demand, is through a worldwide carbon tax (Qian Wang et al, 2016).

#### **2.4.2 Decrease in fossil fuel byproducts (Carbon emissions)**

Ex-post assessments of carbon tax plans have demonstrated that a carbon duty could add to a decrease in CO<sub>2</sub> outflows. Norway's carbon tax had decreased the family outflows by 3–4% somewhere in the range of 1991 and 1993; and in Denmark, a 7% decrease in mechanical CO<sub>2</sub> discharges had been accomplished from 1991 to 1997 while all out modern yield expanded by 27%. Likewise, an IPCC report shows that discharges in Sweden were 9% lower in 2007 contrasted with 1990. Moreover, ex-bet recreations likewise uphold the duty's viability. In view of a writing audit, the IPCC announced that 10% higher fuel costs may prompt about a 7% decrease in fuel use and emanations over the long haul (Qian Wang et al, 2016). A 2015 investigation of carbon charges in English Columbia found that the expenses diminished ozone depleting substance discharges by 5–15% while having immaterial generally speaking monetary impacts. (Brian Murrayab ,Nicholas, Riversc,2015).

#### **2.4.3 Impact on economic development**

A 2020 investigation of carbon charges and monetary development in affluent majority rule governments indicated that current carbon charges have not hurt or restricted financial development (Daniel, 2020). Carbon tax is a substitute of guideline since it least courtesy higher pay gathering. (Gilbert E.Metcalf, 2019).

#### **2.4.4 Distributional impacts of Carbon tax**

Various investigations have discovered Carbon tax is backward. In an investigation of Ireland, without an increment in social advantages and tax reductions, a carbon assessment would hit helpless family units harder than rich families. (Tim Callana et al, 2007). Additionally, as per an examination in Mexico, the distributional impacts of burdening carbon dioxide (CO<sub>2</sub>) are marginally reformist. Carbon tax has insignificant impact on family unit government assistance. (Sebastian Renner, 2017).

#### **2.4.5 Impact on Carbon emissions in Least develop countries**

Arief A. Yusuf and Budy P. Resosudarmo, (2013), recommends that, as opposed to most industrialized nation contemplates, the presentation of a carbon tax in Indonesia a non-industrial nation isn't really backward. The primary change and asset redistribution impact of a carbon tax is agreeable to factors granted all the more consistently by country and lower pay families. What's more, the expenditures of lower pay families (particularly in provincial territories) are less delicate to the cost of energy-related items. Income reusing through a uniform decrease in the product charge rate may lessen the unfriendly total yield impact, while uniform single amount moves may upgrade progressivity.

### **2.5 Advantages of Carbon Taxation System**

- Carbon tax is wellsprings of income for the public authority. This extra income can be utilized to decrease other assessments that create mutilations in the activity of the economy.
- The effectiveness with which different components of the economy work can be all the while improved, Expansion in business rate and in Gross domestic product and furthermore connected with a reduction in neediness (G. Allan et al. 2014).
- The sway the carbon tax had on discharges, market force and costs are introduced. The last area investigates the ramifications of the experimental outcomes for strategy creators. (Gordon Leslie, 2018).

- There are different degrees to which strategy producers could actualize the objective rule in a carbon tax. This decision fundamentally impacts the degree to which the expenses jam "worldwide intensity" just as the authoritative plausibility of the assessment. Simultaneously, the incomplete objective based expense could accomplish more than 90% of the decrease in U.S. utilization related emanations that would happen under the full objective based duty. (Lawrence H. Goulder, 1992).
- The transient impacts of a carbon taxation will ultimately swell all through the economy with conceivably astonishing results. Over the long haul, the decrease exercises in organization may bring long haul benefits as burdening carbon can push firms to diminish energy utilization and partner costs through low-carbon innovation development and establishment, in this manner the organization may turn out to be more serious on the lookout (Qian Wang et al, 2016).
- For families, carbon moderation exercises can improve the climate quality and relieve the unfavorable effect of environmental change along these lines can carry long haul natural advantages to individuals (Qian Wang et al, 2016).
- It is not difficult to execute as Chinese government embrace numerous choices to lessen their GHG emanation to accomplish focus of Paris arrangement, yet at end they receive Carbon tax collection since it is not difficult to actualize and more viable than some other Instrument of diminishing GHG outflow (Hongxia Zhanga et al, 2019).

## **2.6 Challenges and Barriers in appropriation of carbon Tax**

- The consistent monetary development in barely any coming years prompts a circumstance with more energy utilization, expanding creation and Vehicular contamination which will prompt different poison outflows in non-industrial nations. Thusly viable dynamic help at present is desperately required and short to log term observing plans are unequivocally required which relies on a coordinated and solid dataset of outflows. Yet, as of now, absence of durable and exact emanation data set is the significant hindrance (Hongbo Fu, Jianmin Chen, 2017).

- Nonetheless, numerous nations that are encountering the strain to control CO<sub>2</sub> discharges are as yet reluctant to make moves to actualize a carbon/GHG charge or a fossil fuel byproduct exchanging plan, in spite of the logical proof on their viability in decreasing energy utilization and related emanations. A significant purpose behind the present circumstance is that ecological expenses regularly face political resistance from both the business and general society. There are numerous instances of bombed charge activities, for example, the energy charge in the US in 1993, the fuel charge lift in the UK in 2000, a petroleum products charge in Switzerland in 2000, a street evaluating in Edinburgh in 2005, and the French carbon charge in 2010 to give some examples. It is accepted that carbon charges will in general adversely influence Gross domestic product development and worldwide intensity of ventures just as prompting backward distributional impacts. The potential unfriendly distributional effect is oftentimes seen as one of the primary snags. Because of contrasts in pay, day to day environments, utilization inclinations and examples, diverse financial gatherings would respond distinctively to similar improvements (Qian Wang et al, 2016).
- The benefit amplifying reaction of firms can bring about balance pieces of the pie changing to such an extent that organizations with clean minor units lessen their creation and firms with filthy peripheral units increment their creation, consequently this benefit boosting approach of businesses block the selection of carbon tax assessment framework. Monopolistic retailers are another deterrent in selection of carbon charge (Gordon Leslie, 2018).

## **2.7 Carbon taxation framework in Pakistan**

### **2.7.1 Legislative arrangement**

As per 5.1i of Public climate Change strategy 2012, Carbon charge has a lawful arrangement in Pakistan, since it is expressed "consider presenting carbon tax on the utilization

of naturally unfavorable energy age from petroleum products". Yet, there is no execution of Carbon tax assessment framework in Pakistan till now. Moreover, 5.1 j expressed that Advance and give motivating forces to exercises needed for expanding the energy-blend and changing to low-carbon petroleum products, and create native innovation for CO2 Catch and Capacity (CCS); Squander Warmth Recuperation, Carbon age, Coal Bed Methane Catch; and Consolidated Cycle Force Age.

## **2.8 Research Gap**

The whole above discussion point out the importance of Carbon Taxation and shows there is need of determining the Impacts and Norms of Carbon Taxation in context of Pakistan as there is not such study have been conducted in scenario of Pakistan which helps to provide a way forward for effective adoption of such system in Pakistan.



## **Chapter 3**

### **METHODOLOGY**

In this chapter, a general arrangement for leading examination is hinted at and advises what, when and how one needs to finish the errands. It characterizes each progression in the examination cycle from top to bottom and gives a calculated design inside which exploration must be led. The examination is completely an arranged work as John Best says, "research is a more methodical action coordinated towards disclosure and the advancement of a coordinated group of information" (Sharma, 2004). This part gives a definite record of techniques and endeavors utilized in leading this exploration. It presents a total situation of the improvement of the exploration proposition the examination configuration settled based on starter writing study, the methodology embraced to choose the examination region, testing strategies, the nuts and bolts followed to choose the example size for the zone. It likewise gives insight regarding the strategy embraced for both essential and optional information assortment, the strategies to solidify and investigate all data assembled and to introduce all examination in an arranged archive.

#### **3.1 Research Design**

The study adopted quantitative and qualitative techniques. The quantitative technique is useful since the study was intended to prove or disprove, by mathematical and statistical means, the suppositions stated here. The quantitative approach was driven by a sample survey, used because respondents were scattered.

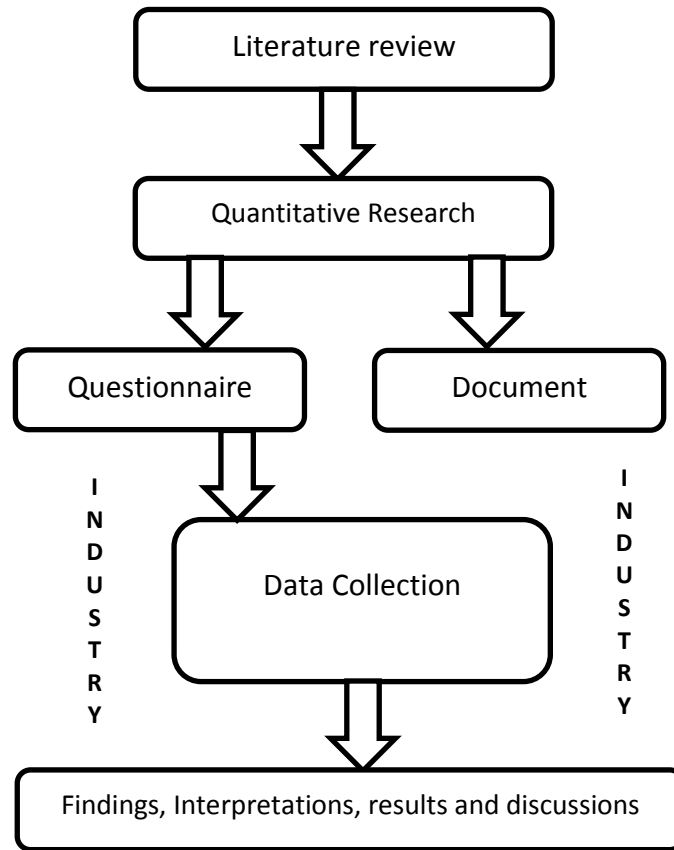


Figure 4.1 Research Design

### 3.2 Case Study Area

Lahore (2<sup>nd</sup> Largest City of Pakistan) was taken as case study for this Research. Its growing population leads to many Environmental issues e.g. Lahore is rank at higher position in poor air quality in the world. Increasing fuel consumption and expanding industries leads to increase in Mton of Carbon Emissions.

### 3.3 Type of Data

The precision of any exploration depends on the system/approach embraced in right way for overview, like inspecting, poll, meetings or perceptions. As Williams said "Anybody can

do an awful study... to do a decent overview requires ability and polished methodology at each stage. The plan, inspecting, survey advancement, meeting, investigation and announcing, in view of a broad hypothetical structure all around grounded practically speaking and methodological examination." (Morton-Williams, 1993:2). In information assortment measure, data was accumulated by utilizing various techniques including auxiliary information assortment and essential information assortment. Essential information is gathered through field reviews and Secondary information is gathered by concerned office and sources.

### **3.3.1 Secondary Data**

Most of Secondary data is collected by published research articles in International Journals during last 10 years.

### **3.3.2 Primary Data**

Primary data is collected through field surveys by using specific sample size. Participants are selected by Random Sampling. And Surveys are conducted by in person as participants have not responded easily. They have reluctant to answer many of Questions in questionnaires.

## **3.4 Instrument of Data Collection**

### **3.4.1 The questionnaire and survey design**

The questionnaire consisted of six sections. The first section had included an introduction to survey, Background Information and government policies towards carbon taxation to help respondent understand goal of survey. Then asked questions about Name of respondent , Age of Respondent , Education of respondent , Job Experience in Industry, Designation of respondent , Time of Survey and Industrial Location to maintain a respondents profile.

The second section had questions assessing the respondent's awareness, and attitudes towards Carbon Taxation. The Third Section had questions about Industrial Structure e.g. type of industry, level of production, environmental taxes, skilled labor , Carbon footprints of Industries etc. The fourth section had questions assessing the impacts of Carbon Taxation on Industries in

term of Price and Productivity. The Fifth Section consisted on Questions about willingness to adopt carbon Taxation. The Last section had questions about barriers in Implementation of Carbon taxation.

In this survey, respondents answered asked questions about awareness, Structure, Impacts in term of price and productivity, acceptance and Barriers in adopting Carbon Taxation. Binary logistic regression to analyze the associations between dependent and independent variables had used. The dependent variables (awareness and acceptance) were ranked based on the questionnaire, which used a five-point Likert scale ranking the respondent's attitude as Not familiar, Slightly Familiar, Somewhat Familiar, Moderately Familiar, Extremely Familiar. Overall, this Ranking was reclassified into two main outcome categories (Familiar, Not Familiar) for a more conclusive analysis as some choices had few respondents. The independent variables included the age, education, Designation and Type of Industry. Awareness was grouped into fifteen categories that were scaled from 1 and 2, with any scores 1 classified as Familiar and scores 2 classified as Unfamiliar.

### **3.4.2 Sampling and data collection framework**

In this study, we used the random stratified sampling technique that organizes the sample in Industrial Estates of Lahore for national representativeness to ensure that the sample selection is randomly distributed across important sub-groups. From each of the randomly selected Industrial Estates, 105 Industrial Units are randomly selected. The Employees or Industrial Units e.g. Engineers, PROs, Supervisors, Policy Makers or head of units etc. were respondents of survey to ensure the sampling was random. The survey was conducted by visiting Industrial Units and with direct interaction with respondent. Collected data is entered into SPSS spreadsheet. In addition, the representativeness of the sample to the population was tested with the Pearson chi-square independence test for the socio-demographic variables.

## **3.5 Methods of Data Analysis**

A survey from total of 105 Industries was conducted for a month beginning in January 2020. At a 5% significance level, the evidence for the rejection of the null hypothesis of the

equality of means was found for only one socio-demographic variable. In the other seven socio-demographic characteristics, there were no statistically significant differences reported, indicating the representativeness of our sample to the population. After the collection of sufficient data, the data is subjected to various statistical and descriptive analyses. Following Data Analysis Techniques are used in this research;

### **3.5.1 Descriptive Analysis**

In quantitative research analysis is based on numbers. The data was prepared before analysing by checking for missing data, removing outliers, transforming variables etc. SPSS was used as tool for Analysis. Cross Tabs, Frequency tables etc. were prepared by SPSS.

### **3.5.2 Statistical Analysis**

Statistical Analysis was also performed on organized data by using SPSS software. Regression Analysis was performed to determine the relationship between dependent and independent variables. Hypothesis testing technique had used in Analysis.

#### **3.5.2.1 Reliability Analysis**

Reliability Analysis implies the way that a scale should dependably reflect the form it is assessing. A point of view where the expert can use Reliability analysis is when two insights under assessment that are similar to each other with respect to the advancement being assessed also have a similar outcome. In experiences and psychometrics, enduring quality is the overall consistency of an action. An action is said to have a high solid if it produces similar results under consistent conditions. "It is the trait of a lot of grades that relates to the proportion of unpredictable goof from the assessment cycle that might be embedded in the scores. Scores that are outstandingly strong are accurate, reproducible, and unsurprising beginning with one testing occasion then onto the following. That is, if the testing cycle were reiterated with a social affair of test takers, fundamentally comparative results would be gained. Various kinds of steady quality coefficients, with values going between 0.00 (much bumble) and 1.00 (no slip-up), are by and large used to show the proportion of error in the scores. Cronbach's alpha or coefficient alpha, is the most well-known grade reliability coefficient

for single organization (i.e., the unwavering quality of people over things holding event fixed). In this research data is seemed more reliable as the value of Cronbach's alpha is 0.879 which is near to 1 (indicate that the methods of information is more reliable).

### **3.5.2.2 Regression Analysis**

Regression Analysis, a measurable procedure, is utilized to assess the connection between at least two factors. Regression analysis causes an association to comprehend what their information focuses address and use them in like manner with the assistance of business scientific procedures to improve dynamic. Jason E king , (2008), indicates regression analysis best predicted the complex relationship among variables and forming predictive equations.it is a statistical tool used in many researches worldwide. In this research, it is used to measure the Predicted Value of Carbon Taxation Acceptability in relation to independent variables i.e. X1=Age of Respondents, X2=Education of Respondents, X3=Job Experience of Respondents, X4=Awareness towards Fossil Fuel Consumption, X5= Awareness towards Industrial Pollution, X6= Awareness towards Carbon Emissions, X7= Awareness towards Carbon Trading, X8= Awareness towards Green Growth, X9= Awareness towards Environmental Deterioration due to Extraction of raw material and Production, X10= Awareness towards Environmental Deterioration due to rise in Temperature.

Following are alternative hypothesis and Null hypothesis formulated for evaluation of awareness and Acceptance of Industries about Carbon Taxation.

**Alternative Hypothesis:** **Ha.** Acceptance of Carbon Taxation System is associated with Education, Age, Experience and Variables of Awareness.

**Null Hypothesis:** **Ho.** Acceptance of Carbon Taxation System is not associated with Education, Age, Experience and Variables of Awareness.

### **Binary Logistic regression Analysis**

M Tranmer, M Elliot (2008) explained that the socio economic factors are all the time absolute, as opposed to span scale. In numerous cases research centers around models where the needy variable is clear cut. For instance, the dependent variable may be 'jobless'/ 'utilized',

and we could be keen on how this variable is identified with sex, age, education, and so forth for this situation we were unable to do a multiple regression analysis as a significant number of the suspensions of this procedure won't be met, as will be clarified hypothetically beneath. Rather we would do a binary logistic regression analysis. Subsequently, strategic relapse might be considered as a methodology that is like that of various direct relapse, however considers the way that the ward variable is all out.

Therefore in this research the Binary logistic regression analysis has been performed by using spss, and probability of acceptance is measured by using following formula;

$$P(Y) = \frac{e^{\text{Logit}}}{1 + e^{\text{Logit}}}$$

$$P(Y) = \frac{\text{Odds}}{1 + \text{Odds}}$$

$$\text{Odds} = e^{\text{Logit}} = e^{B_0 + B_1X_1 + B_2X_2 + B_3X_3 + \dots + B_nX_m}$$

### 3.5.2.3 Chi-Square Test

Delucchi, Kevin L, (1993) demonstrated that the articulation "chi-square" implies both to a quantifiable movement and to a hypothesis testing method that makes an estimation that is generally coursed as the chi-square transport. The primary chi-square test, known as Pearson's chi-square test serves both as a "integrity of-fit" test, where the data are arranged along one estimation, and as a test for the more ordinary "plausibility table", in which game plan is across at least two estimations. A chi-square test for autonomy analyzes two factors in a possibility table to check whether they are connected or not. 0.05 is alpha worth. Worth under 0.05 shows there is importance contrast between two factors, and reject the invalid speculation. Worth under 0.05 means elective speculation is acknowledged.

### 3.5.2.4 Social Impact Indices

Morganti, L., Donders, K., Katz, R., Koutroumpis, P., & Callorda, F. M. (2014) gauged the the social impact indices help to highlight the cumulative impacts of discrete information and help in policy formulations explicitly described the UK scenario.

Social impact indices have formulated for assessment of social indicators. Following formula has been used for calculation of transformed values for social impact assessment;

$$YIS = \frac{(x5 - x4) - (x2 - x1)}{5}$$



## Chapter 4

### RESULTS AND DISCUSSIONS

#### 4.1. Industrial Structure

Modern Industrial structure depicts the production and information relationship in different automatic layers. Extent of creation components in various businesses and their common cooperation is vital for deciding the ideal use of assets. Modern design changes and advances with the adjustments in the generally speaking monetary base. In the globalized world economy with quick changes in innovation and advancements each industry needs to keep itself on the track of development to harvest greatest additions (Zhao Yulin, Muhammad Mudassar, 2013). Whereas Economic Corporation and Organizations Chamber of Commerce and Industry reported Pakistan's economy might be portrayed as remaining at a semi-industrialized phase of advancement. The mechanical area represents about 24% of GDP. As per the latest figures from the Economic Survey of Pakistan, delivered each year prior to the Federal Budget, the country's modern area by and by establishes generally 25% of the nation's GDP. Yield in the assembling area saw development of 3% in FY11 when contrasted with extension of 5.5% in FY10 on the back of solid execution from both the little and medium assembling areas. As Pakistan is one of the significant makers of cotton, the nation has a sound material industry. Cotton material creation and attire fabricating are Pakistan's biggest businesses, representing about 55% of the stock fares and practically 40% of the utilized workforce. Cotton and cotton-based items represent 61% of fare income of Pakistan. The fare profit of material items in FY11 showed an increment of 29.9% this year over a year ago. Pakistan during the most recent few years has likewise made tremendous steps in different businesses. Some of these incorporate autos, manures, drugs, and concrete. These have arisen as solid entertainers in the fare market, which is empowering.

In Industrial survey the questions were asked about the basic industrial structure e.g. type of industry, level of productions, carbon footprints of industry and use of green growth strategies and the responses are listed in table 8.

**Table 4.1**

**Industrial structure**

<b>Industrial Structure</b>		<b>Frequency</b>	<b>Percentage</b>
<b>Type of Industry</b>	Transportation Equipment's & Vehicles	38	36
	Pharmaceutical	34	32
	Food Processing	13	14
	Garments & Printing	18	17
<b>Level of Production</b>	Low	7	6
	Medium	38	37
	High	59	56
<b>Heavy Manufacturing</b>	Presence of Heavy Manufacturing units	0	0
<b>Area Served</b>	Local	68	64
	Regional	34	32
	National	3	2
	International	0	0
<b>Strategies for Green Growth</b>	Use of Energy efficient Projects	3	2.9
	Operational Treatment plant	0	0
	Paying Environmental Tax	0	0

In random sampling of 105 Industrial units in Lahore, Industries are classified on the basis of their type as; 36% industrial units are Transportation Equipment's & Vehicles manufacturing Industry, 32% are Pharmaceutical industry, 14% are Food processing Industry and 17% are Garments and printing. Similarly majority of industries have high level of production (56%) and few one (6%) have low level of production whereas slightly above one third (37%) have moderate level of production. Out of total case study, not even a single industry responds to have any heavy manufacturing unit. The Carbon footprints or area served by industries ranges from local, regional and national level. But majority of Industries as more

than half of industries (64%) are locally served about one third (34%) regionally serving industries and very little (2%) served at national level. All (100%) industrial units response not having a heavy manufacturing unit. Apart from questions about basic industrial structure, industries were also asked questions about having green growth strategies and all industrial units responds not having operational treatment plant and paying any type of environmental tax. Very few (2.9%) responses were about use of efficient energy project.

Greening Pakistan's industry has gotten a basic to limit its antagonistic effects on the climate and society, yet additionally to support the area's development. In spite of considerable development in late many years, the modern area is yet to make its full commitment to Pakistan's turn of events. Restricted thought of the developing asset use, waste, and contamination that have gone with industrialization has forced mounting financial, ecological, and social expenses. This is especially obvious in huge metropolitan areas on which ventures agglomerate, like Lahore. Simultaneously, poor ecological administration has become an obligation for Pakistan's enterprises, which remarkably subverts the seriousness of fare situated assembling areas. The difficulties presented by enterprises' absence of ecological supportability imperil Pakistan's turn of events and are required to deteriorate under the same old thing situation.

## **4.2 Important Policy Topics for Industries**

Apart from questions about type, level of production, service area etc. questions about important policy topics were also asked by respondents. Main objective of these questions is to know about important policy topics in view of industries. The Responses shows more positive attitude towards objective of research as 98% respondents highlighted Managing Competitiveness and carbon leakages as highly important policy topic for consideration for their industry. Secondly 85% responses were about "Following up to date global policy development" and "minimizing market instability". After this 84% respondents showed attitude about consideration of ensuring equity and fairness as an important policy topic, 80% Responses

about creating links between systems, 78% responses about setting Schedule for GHG reduction and 74% about Ensuring Flexibility.

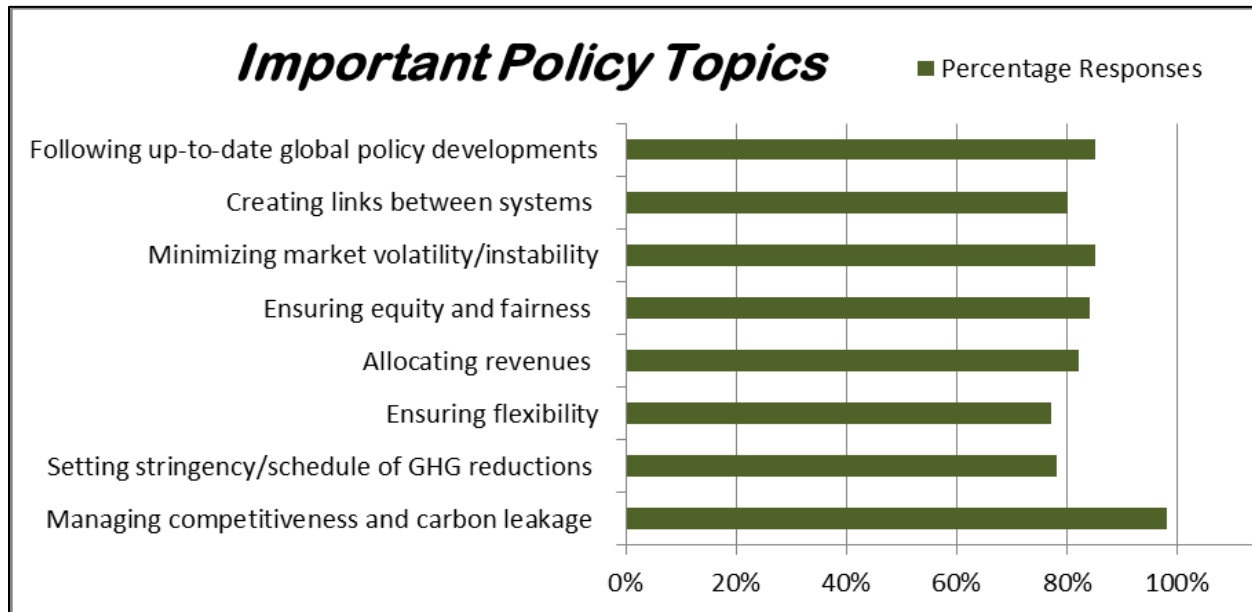


Figure 4.2 Percentage responses of important policy topics for industries

Although the Industrial responses are much positive but without governmental intervention effective regulation and use of energy efficient technologies is impossible. The governmental effort in this regard can be observed as Punjab's Growth Strategy 2018 imagined that development should be private area drove, speculation driven, trade arranged, environmentally sound, and work escalated. Similarly Carbon pricing is discussing at national level and there is legal provision of such taxation in Climate Change policy 2012.

### 4.3 Socio-Demographic Characteristics

In order to check either we are reaching to our target audience or not, determining the socio-demographic characteristics is crucial. The socio demographic characteristics of the 105 industries are listed in Table 4.3. Out of total sample 68% (n=72) are manufacturing Industries and the remaining (n=33) are classified as processing units/Industries. In the random sampling, 99% of the participants (n = 105) are men and 1% is woman who are further divided into two age groups (young (19-40) and Older (40+)). More than two third respondents (71%, n=75) are less than 40 years of age and about one third respondent's are above 40 years. On the basis of

Education of respondents, 64% Respondents are characterized in Technical Education group (Engineering or equivalent Degree) and 36% respondents are in Non-Technical Education group (Non-Engineering Degree). Majority of respondents (70%, n=75) are much experienced (having more than 10 years' experience in industry) and near about one third (30%) respondents have less than 10 year Industrial Experience. Similarly, according to their designation 11% respondents are executives, 36% Administration Managers, 22% Production Managers and 30% Supervisors.

**Table 4.3**

**Socio-Demographic Characteristics**

Socio-Demographics		Frequency	Percentage	Mean	Standard Deviation
<b>Age</b>	Young (19-40 years)	75	71%	35	9.23
	Older (40+ Years)	30	29%		
<b>Gender</b>	Male	104	99%	1	0.09
	Female	1	1%		
<b>Education</b>	Technical	68	64%	14	2.12
	Non-Technical	37	36%		
<b>Job Experience</b>	Fresh	31	30%	8.5	7.60
	Experienced	74	70%		
<b>Designation</b>	Executives	12	11%	3	1.018
	Managers (Admins)	38	36%		
	Managers(Production)	24	22%		
	Supervisors	31	30%		

#### 4.4 Big Industrial Issue in Pakistan

Pakistan has faced major challenges in its socioeconomic situation over past seventy years. However, not all problems have been addressed. The key problems of today include: Poverty, Security Issues, Poor health, Heavy taxation, Environmental Degradation, Poor economic conditions, Unemployment, Lack of Education, Infrastructure Inequalities.

The first section of questionnaire includes questions about awareness of Carbon taxation system. The first question ask in his section was “What are top three major issues in Pakistan?”. In response to this question the respondents have to rank three most serious issues facing Pakistan today among above listed issues, the resultant response is shown in figure 4.4.

According to their opinion, big problems in Pakistan are Poverty and Poor Economic Conditions, Environmental Degradation, Heavy Taxation and Security Issues.

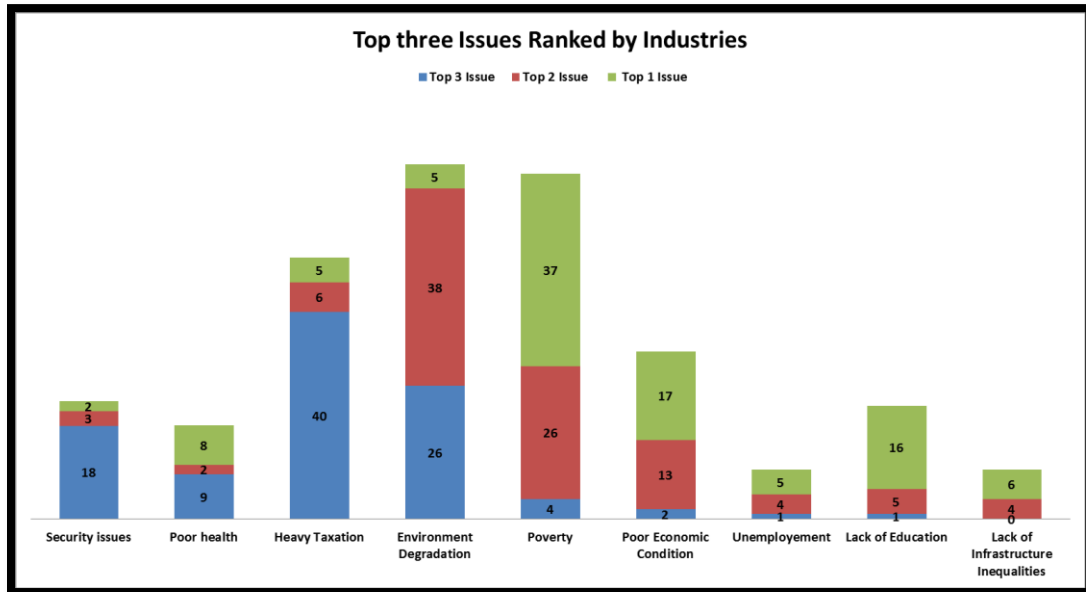
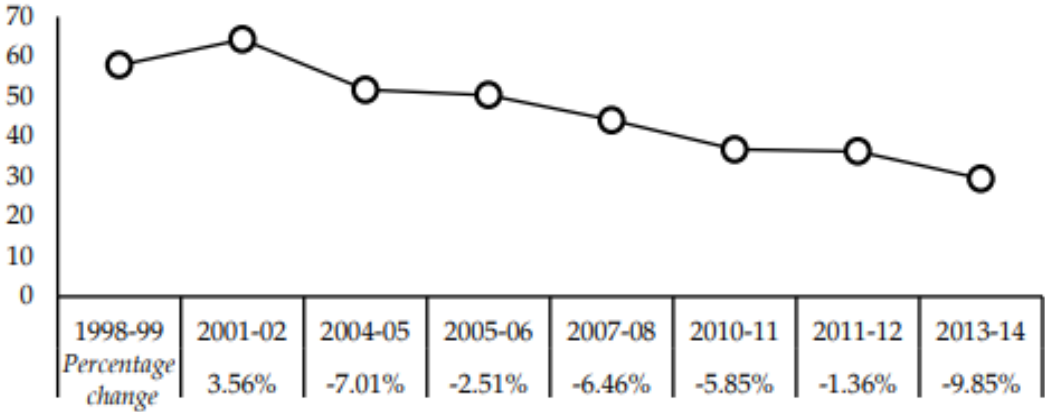


Figure 4.4 Top 3 Issues Ranked by Industries (source: field survey)

#### 4.4.1 Poverty and Poor economic Conditions:

Poverty is a state or condition in which a person or community lacks the financial resources and essentials for a minimum standard of living (purchasing power less than 1.90\$ per day) and poor economic condition is defined as a household's inability to access wealth resources that are enough to provide for basic needs for a period of three months. According to report of Asian Development bank 2015, 24.3% of the population lives below the national poverty line in Pakistan. Similarly another Asian development bank report 2002, addressed the major issues of poverty that in excess of 12 million individuals were added to the poor in Pakistan somewhere in the range of 1993 and 1999. The rising neediness was the aftereffect of poor administration and moderate monetary development. In random sampling, poverty is second frequent ranked issue. In opinion of 37% respondents poverty is mega issue in Pakistan, in view of 26% respondents it is second major issue in Pakistan and very few one have opinion it

is third major issue in country. Similarly when they are asked about poor economic condition the responses shows 17% respondents have opinion it is major issue in Pakistan and 13% respondents ranked it as second mega issue in Pakistan.



**Figure 4.4.1 Poverty Trend in Pakistan**

**(Source: economic survey of Pakistan 2015-16)**

The declining pattern in poverty is seen in Pakistan during most recent a very long while as present in figure 4.4.1. What's more, in the event that we return before 2000s than the 1970s and 1980s was exchanged during the 1990s. The event of poverty extended from 26.6 percent in FY1993 to 32.2 percent in FY1999 and the amount of poor extended by in excess of 12 million people during this period. Since FY1999, money related advancement has moved back further, improvement spending has continued declining; moreover, the country has experienced a genuine dry season. It is in like manner outstandingly conceivable that the event of destitution in Pakistan today is out and out higher than in FY1999. Different factors explain the presence of and extension in desperation in couple of many years prior. Regardless, vulnerable organization is the key essential justification poverty in Pakistan. Concerning monetary parts, decline in the Gross Domestic Product (Gross homegrown item) improvement rate is the brief justification the development in poverty over the span of the two or multi decade. With regards to the commitment inconvenience, extending commitment organization necessities achieved a creating money related press, which along these lines incited a declining degree of GDP being spent on progress and social regions in the 1990s. Environmental debasement is also a justification destitution in Pakistan. The environment destitution nexus

shows itself most particularly in prosperity impacts. For model, waterborne disorders are expansive since 17% of the metropolitan what's more, 47% of the rural people doesn't move toward clean drinking water. The poor also will overall be more powerless against the effects of air and water defilement, both in commonplace and metropolitan domains, given their limited induction to quality clinical benefits. The normality of disease intensifies destitution at first by persuading the poor to devote truly growing degrees of their confined compensation to prosperity costs, what's more by lessening effectiveness.

**Table 4.4.1**

**Table Dimensions of Poverty in Pakistan**

<b>Spatial Dimensions</b>	Destitution in Pakistan has truly been higher in rustic zones than in metropolitan territories.
<b>Gender Dimensions</b>	Poverty is more inclined towards women as compared to man
<b>Regional Differences/Dimensions</b>	Rural areas are more vulnerable to poverty
<b>Economic Dimensions</b>	Chronic poverty (mean expenditure of household fall below poverty line) and transient poverty(mean expenditure of household higher than the poverty line)

(Source: Asian Development Bank report 2002)

In Lahore, Record high swelling has made it excessively hard for the poor to manage the cost of essential food varieties; notwithstanding, one ware they actually get for practically free is water, yet it's contaminated to such an extent that as opposed to keeping their immunocompromised bodies in working condition, it really is harming them. Admittance to clean drinking water will consistently rely mainly upon nearby arrangements. These incorporate, most importantly, expanded regard for law and order, property rights, opportunity for individuals to exploit their pioneering soul and express their discontent with their parcel,



also other essential opportunities Expanded regard for basic liberties isn't simply basic to decrease neediness and secure natural, it additionally turns out to be a significant thing of human government assistance and advancement. Governments abusing basic liberties guarantee there is no decrease in neediness. Additionally, social orders where regard is concurred based on riches and impact breed destitution. The deeds considered a transgression in the public eye are disregarded or even liked if that is finished by a rich and powerful individual. We need evenhanded development; anyway development, obviously, has never ensured that material abundance will be dispersed in a just, not to mention an equivalent, way. We need to embrace a reasonable approach where each resident appreciates fundamental necessities with deference. At the point when least essential requirements of an individual are satisfied through a straightforward framework, he/she acquires sense of pride and would not show homage the desires of the rich to take care of job that harms his/her regard. At the point when essential necessities of a poor are not tended to, he/she would acknowledge embarrassment from the powerful to get some donations. Destitution as such may not offer ascent to illegal intimidation, however not many disappointed components do control the poor for their potential benefit. Our administrations are offering empty talk to destitution. They don't dare to address the primary causes that breed destitution. We need to eliminate disparity of resources and openings, or the inconsistent distributional results of development. What's more, on the grounds that untalented positions are consistently the first setback in quite a while, while work for the most part lingers behind yield recuperation, diminished public interest in wellbeing, instruction, and other social projects eventually increment the weakness of poor people.

We have seen that more often than not our legislatures are occupied in satisfying the personal stakes that are the fundamental driver of neediness. The brokers cover little expense (practically not duty) however they are spoiled in light of their road power. The carriers don't settle burdens and disregard transit regulations, however the public authority doesn't set out to capture them. Any lawful activity against them brings about a countrywide vehicle strike. The duty authorities can't strike or join records of assessment defaulters that hurt financial backer certainty (just in Pakistan). The expense dodgers or defaulters are managed carefully in created

economies regardless of their societal position. Development could turn out to be more steady, with a reliably countercyclical macroeconomic strategy position, judicious capital-account the executives, and more noteworthy strength to outer stuns. We have not built up any cradle besides. The consideration of most governments especially the current one is more centered on cornering their rivals. In doing as such, they give little consideration to the monetary side of administration. We have seen China diminishing the quantity of poor by 400 million (practically twofold our populace) through predictable and reasonable approaches. Truth be told, economies that have prevailing as far as both financial development and destitution decrease throughout the most recent thirty years have done as such by embracing practical, heterodox approaches. Regularly summoning financial backer and market-accommodating language, they have commonly empowered private speculation, particularly in wanted monetary exercises, for example, those that set out more occupation open doors or offer expanding gets back to scale. We don't draw financial backers through predictable and reasonable approaches that have constrained practically all unfamiliar financial backers to request ensured paces of return on their tasks for quite a while. Pakistan is such a business bank that offers them a pace of return of 15-18 percent on their ventures through sovereign assurances - the most noteworthy on the planet. Limited scope programs like miniature credit, formalization of land titles, and administration changes somewhat help enhance the conditions confronting poor people, yet they have not diminished neediness essentially.

The idea and measurements of neediness have definitely changed over the most recent 70 years in Lahore. Seventy years back, there was no appetite destitution in Pakistan when poor people in any case were asset less. At the hour of freedom, Pakistan was the food bushel of joined India. Despite the fact that the nation was poor, the state and the common society guaranteed that the poor didn't rest hungry. Food costs were extremely low. Additionally, in those days, state land was unreservedly infringed to set up ghettos. This was permitted to oblige the enormous deluge of millions of evacuees in the country. Industry was scant and little and bungalow ventures gave work to the vast majority of the number of inhabitants in working age. Likewise, agribusiness consumed the majority of the laborers as landholdings were bigger. An everyday bet could bear the cost of one weeks' nourishment for

the family on his negligible day by day wage. Power was phenomenal. After twenty years, industrialization got, which sped up relocation into the urban areas. As land turned out to be scant, costs of rents fired going up as well, lessening the consumable excess for food. The poor could send their youngsters to government funded schools, where the norm of instruction was acceptable. A portion of the families wriggled out of destitution when a portion of their youngsters through difficult work and commitment entered common administrations or different positions.

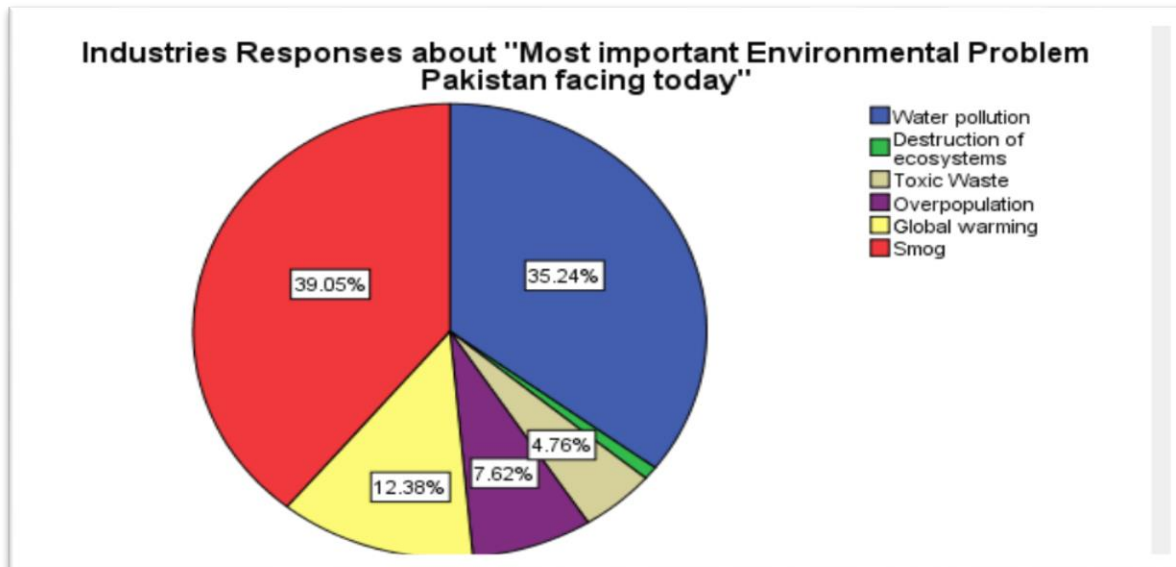
Following two additional many years (1987), the poor began to feel the warmth of hardship. Food was not as effectively accessible on the grounds that costs had ascended past income. Hindering and unhealthiness began rising. Still these two condemnations were the most reduced in Pakistan in the whole area. After 10 years, the poor began confronting all components of neediness. They tasted hunger more than ever. Sanctuary turned into an extravagance for them. The rents went strongly up. Debasement began ascending as time passes. The poor began living in dread. Landholdings in country territories weakened, additionally expanding rustic neediness. By and large, state administrations and framework, including medical care, instruction, and transport weakened unnecessarily, exacerbating things for the regular workers. Hindering and hunger arrived at disturbing levels – most noteworthy in the locale contrasted and least thirty years back. This likewise brought about declined work efficiency. The odds of the helpless moving up the social stepping stool practically disappeared, as they proved unable contend in information and wellbeing with somebody from the well-off class. In after many years, there was an agonizing spike in food expansion. Mechanical development stayed disproportionate. In certain years most modern areas worked at full limits followed by a lofty decrease and immense unutilised limits. This successfully halted new ventures. The nation on normal added 2.5 million laborers in the work market each year. There were less positions than the expansion in the labor force. This further pushed the regular workers beneath the destitution line. The most recent three years have been a bad dream for poor people, yet additionally for those, who are living simply over the destitution line. The food costs have ascended as at no other time. The expansion is the whole way across in the natural pecking order. Along these lines, hindering and hunger have arrived at new levels. As things

stand now it appears to be sure that destitution will remain in Pakistan within a reasonable time-frame. A humble monetary recuperation would decidedly affect poor people, and their condition is probably going to fall apart further

In nations like Pakistan that quite often rely upon unfamiliar help, help contingency and settlement responsibilities have altogether compelled policymaking that will in general punish poor people. Circuitous tax assessment is a dependence that keeps on adding to the wretchedness of poor people. At present, the solitary thing the nation is getting more extravagant in is neediness.

#### **4.4.2 Environmental Degradation:**

Environmental Degradation is the consumption or disintegration of climate as far as decrease of assets. The normal assets are being utilized persistently and superfluously which is prompting the Environmental disintegration. Exhaustion of water, soil and air is continuously influencing the climate in an unwanted manner. In basic words, there is a decrease in world's regular assets which is actuating ecological corruption. Water pollution, Toxic waste, over population, global warming, destruction of ecosystem and smog are major Environmental issues in Pakistan. In Second question of 1<sup>st</sup> section of questionnaire, the respondents were asked "What is most serious environmental issue facing Pakistan today?. And in random sampling, responses are received about environmental deterioration are shown in pie chart 4.4.2. Majority of responses (39.05%) were about smog as major environmental issue, Water pollution is ranked as second major environmental problem ( 35.24% responses ) and globe warming as third major Environmental Problem. apart from these three environmental issues , the reaming are less likely ranked as major environmental issue.



**Figure 4.4.2 Industries responses about most serious Environmental problems Pakistan facing recently (Source: Field Survey)**

Lahore experiences significant degrees of air contamination, with the city routinely positioning at the highest point of IQAir AirVisual's live contamination rankings of major worldwide urban areas. Nonetheless, contamination simply rose to the highest point of the public's cognizance in mid 2017, when significant air quality information was distributed without precedent for Pakistan. Without openly accessible government information, an organization of resident worked sensors started to screen fine particulate matter, otherwise called PM2.5, and report information progressively. The information exposed Lahore's significant degrees of air contamination, stunning the general population and turning into a media idea.

Air quality in Lahore regularly weakens all through the colder season from October to February when farmers in the more broad Punjab locale set light to the extras of yields, making smoke that adds to brown murkiness. All the while, environment changes mean harms stay got perceptible all around for additional. In November 2019, during the center of Pakistan's "earthy colored dimness season", Lahore reliably came next to Delhi – and sometimes outperformed the Indian city – as the world's most dirtied city on IQAir AirVisual's live rankings of major

overall metropolitan regions. In 2018, Lahore situated 10 in IQAir AirVisual's 2018 World Air Quality Report. Connecting city Faisalabad's air defilement situated number 3, while air pollution in Islamabad – Pakistan's capital city – came in by and large lower at number 239. Karachi air defilement was the most diminished among the four metropolitan regions at number 318. All things considered, Pakistan air defilement caused the country to be situated as the second commonly dirtied in the world with a yearly PM2.5 ordinary of 74.3  $\mu\text{g}/\text{m}^3$ . Air defilement in Lahore is achieved by a blend of vehicle and current transmissions, smoke from block heaters, the burning-through of gather development and general waste, and buildup from building objections. Various components of air pollution join colossal extension adversities of trees to manufacture new roads and designs. Winter air tainting is more awful a result of temperature inversion, which achieves a layer of warm air that is held back from rising getting air poisons.

Pakistan's most recent monetary study for the country has caused to notice the debasing climate in the country. As indicated by the Pakistan Economic Survey 2013-14, destitution, joined with populace development and expanding urbanization is prompting extreme pressing factors on the climate. The report says that natural debasement is both a reason and outcome of destitution and the climate neediness nexus can't be disregarded if compelling and pragmatic answers for cure ecological perils are to be taken. Specialists gauge that ecological debasement may cost Pakistan's economy over PKR 365 billion consistently. This records from insufficient water supply, absence of admittance to disinfection and cleanliness, agrarian soil corruption, indoor and metropolitan air contamination, lead openness, land debasement and deforestation. Truth be told, the climate strains looked by Pakistan over the previous many years have become a significant test for its residents and the economy. In Pakistan, about 80% populace in huge urban communities and don't approach clean water.

Solicitation for new water supply has extended ordinarily to meet local and present day necessities. Lahore is the second greatest populated city of Pakistan with surveyed people of 10 million, with a district of 1014 km<sup>2</sup>. It is arranged on the alluvial plain of Indus Basin on a tallness running between 682 ft. to 698 ft. above mean sea level and is restricted by Ravi

stream in the North West and BRBD Canal on the east and typical yearly precipitation recorded is going to 675 mm. Groundwater is the solitary wellspring of local and mechanical use in the city. The un-masterminded extreme pumpage of groundwater as 1645 cusec has sabotaged spring utilization close by other monetary issues. After creation of Pakistan, the groundwater level in Lahore city was as 15-16 feet which has now shown up at its significance 100 feet. The circumstance being what it is, IRI starts a checking study, in this regard to stand out enough to be noticed to the condition and to propose some mending measure there at and 60 piezometers have been presented in Lahore city district and along Ravi stream to screen the time rate changes in groundwater levels and its quality. These Piezometers have been presented in batteries (3 in each) at the different profundities to screen the upward profile and nature of groundwater. The makers have notice an inconceivable threats to groundwater in the Lahore spring recognizing as over pumpage, current effluents, precipitation of air pollution, sewage and street flood, etc Another factor of this assessment work is that the groundwater levels waver with the stream measure which shows that Ravi stream is contributing towards spring re-invigorate while groundwater levels in Lahore city is falling at the speed of 2.5 ft. every year. Also, the idea of groundwater assessment in the stream reach from Ravi Siphon to Mohlanwal has been made and is found the most really horrible near Shahdra (Lahore City).

Government of Punjab has taken action to severe execution of a boycott forced on consuming of tires and requested harsh activity against violators to deflect exhaust cloud hazard. Directing a significant level gathering to survey hostile to exhaust cloud measures, he featured that smoke-discharging block furnaces cause genuine ecological contamination and in this manner, these block ovens ought to be changed over to crisscross innovation. Punjab Environmental Protection Department has also guided to receive successful measures to move steel rerolling enterprises to climate amicable innovation. The central pastor guided common government offices to remain completely ready and complete their departmental arrangements. Punjab Agriculture Department has also directed by PM to make the prohibition on consuming of harvests' buildup stricter and added that activity ought to be started against the businesses causing contamination.

Socio economic impacts of Environmental depletion are also severed in Pakistan as it is influencing practically every one of the areas of our economy especially water assets, energy, wellbeing, biodiversity, with a significant effect on agrarian efficiency. This is because of changes in temperature, unfriendly impact ashore and water assets and improved recurrence and power of common dangers like dry spells and floods. Dry land regions, for example, parched and semi-dry districts are generally helpless against these changes; such areas are previously confronting huge water deficiencies and temperatures are as of now near their resistance limits. The expanding temperatures increment crop stresses (warm and dampness stresses), change water system water necessities, and expanding the danger of nuisances and sicknesses. Water requests of the country are met by Indus River System that is taken care of by ice sheets in Hindukush Karakoram ranges which are accepted to be subsiding under impact of environmental change and a dangerous atmospheric deviation. The liquefying of these icy masses will bring about expanded water streams for years and years followed by diminished stream streams as the icy masses get exhausted. The central pastor guided commonplace government divisions to remain completely ready and complete their departmental arrangements. The climate strains looked by Pakistan over the a decades ago have become a significant test for its residents and economy. Environmental change represents an extraordinary danger to gains made in destitution decrease and improvement. While environmental change is a worldwide marvel, its effects is felt all the more seriously by the creating world because of their more prominent weaknesses what's more, lesser ability to deal with the impacts of environment change, and likewise, inside society, by peripheral what's more, weak gatherings including ladies and kids. Pakistan's emanations of ozone depleting substances (GHGs) are a lot of lower than rest of the world. Ecological corruption alongside helpless home cleanliness, absence of essential sterilization and dangerous drinking water enormously affects strength of the populace, especially kids under five. Significant Climate Change Related Concerns of Pakistan Most genuine difficulties for Pakistan are the dangers to its Water Security, Food Security and Energy Security, attributable to potential movements in



climate designs, both on worldly and spatial scales, in specific expanded fluctuation of storm, as nitty gritty underneath:

- Increased recurrence and seriousness of extraordinary occasions like floods, dry seasons and typhoons
- Increase in dregs stream because of expanded rates of focused energy precipitation occasions bringing about more quick loss of supply limit because of siltation Rapid downturn of Hindu Kush Karakoram Himalayan (HKH) icy masses, influencing the extent and example of water inflows into the Indus River System (IRS)
- Increased rates of high elevation snow torrential slides and GLOFs (frigid lakes upheaval floods) generated by flooding feeder ice sheets obstructing fundamental un-glaciated valleys
- Reduced agribusiness profitability in parched and semi-dry locales because of expanded warmth and water-stress just as more continuous and serious floods and dry spells
- Abundance of bugs, bugs and microbes in hotter and more damp conditions, especially after weighty rains and floods
- Reduced profitability and fruitfulness of animals because of warmth stress
- Degradation of rangelands and further disintegration of effectively debased developed territories experiencing water disintegration, wind disintegration, water-logging, saltiness and so forth
- Adverse effect on power age limit because of unpredictable stream streams and more regular also, extreme floods and dry seasons
- Increased wellbeing hazards Heat Strokes, Pneumonia, Intestinal sickness, Dengue, other vector-borne illnesses
- Increase in deforestation, loss of biodiversity
- Risks to delicate marine, mountain, and seaside biological systems

- Increased upstream interruption of ocean water in the Indus delta, unfavorably influencing seaside horticulture, mangroves and favorable places of fish
- Threat to seaside urban communities like Karachi because of ocean level ascent and expanded cyclonic movement due to higher ocean surface temperatures
- Non-accessibility of satisfactory, solid yield and waterway stream information in accordance with the necessities of recreation model
- Low versatile ability to antagonistic effects due to absence of specialized skill and low monetary assets

### **4.4.3 Tax Burden and Income disparities**

Although a well-functioning tax collection system is a necessary condition for sustainable economic development of a country. However, the tax collection systems in some developing countries have some shortcomings e.g. Transparency issues, poor tax collection mechanisms, lack of culture of compliance among taxpayers, high economic activities among informal sector, legislative and administrative changes etc. In random sampling the option heavy taxation is also included in big issues of Pakistan and in opinion of majority of respondents (40%), heavy taxation is third major issue of Pakistan shown in figure 4.4.

Our general public is to a great extent made out of low income class/lower center pay class though the abundance is immersed inside a limited gathering of exclusive class at the top; the working class being an unobtrusive lump of the populace. It has been a genuine challenge for each administration to gather charges from the exclusive class and reallocate the impact to the lower echelons of the general public. As per a new report by Oxfam named "Obligation to Reducing Inequality (CRI) 2018" Pakistan has been positioned at 137th situation out of 152 nations which is very low. As far as reformist tax assessment, it has been positioned at 98. The report moreover features that large numbers of the low workers in the general public are ladies who are regularly paid lesser than men and are generally working in a non-secure work climate. In such conditions, it turns out to be very difficult to moderate the impacts of pay aberrations. Plus, the pay inconsistencies are further irritated as the world class and prosperous endeavor to

pass the weight of expense onto the lower classes. Consequently, it gets hard to accurately evaluate where the charge rate precisely lies.

## 4.5 Assessment of Awareness, Acceptance and attitude towards Carbon Taxation

### 4.5.1 Awareness about Carbon Taxation in Industries

The survey participants were asked several questions regarding their awareness, acceptance, Industrial Structure and Potentials or barriers in implementation of carbon taxation system. The first section of questionnaire connected to the respondent’s level of awareness of certain terms related to the green Energy. These are general terms such as awareness with Efficient cars, Solar energy, wind energy, iron fertilization, nuclear energy, efficient appliances, Carbon trading, carbon taxation, biomass/biogas. According to the survey, the respondents were more aware of few terms of Green Energy, with 100% of the respondents indicating being aware of this term “Solar Energy”, 92% with “Wind Energy” and 81% with “Nuclear Energy”(fig 4.5.1).

The term that respondents were least aware of was “Carbon taxation” with 53%, “Carbon trading” with 44%, “efficient cars” with 53%, “Iron fertilization” with 53% and “Bio mass” with 53% of the respondents indicating awareness for these terms (Fig. 4.6.1). This, in part, could be attributed to less exposure to Carbon Taxation technologies and higher education levels.

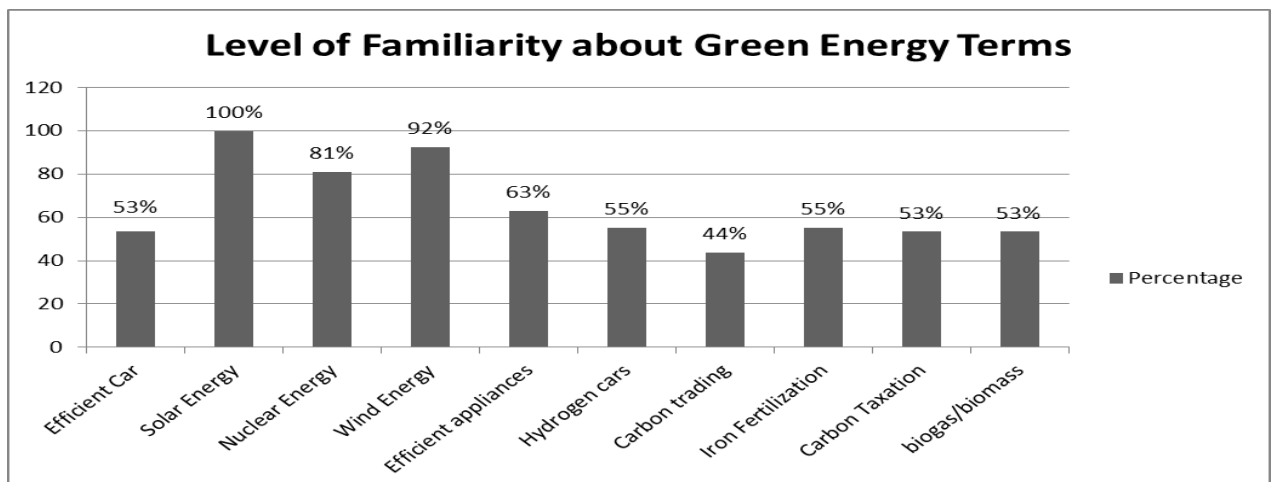


Figure 4.5.1 Level of awareness about green energy terms

In this context, the next questions were focused on terms which are closely associated with carbon taxation e.g. Industrial pollution, Carbon emissions, Carbon Pricing, Green growth, Environmental deterioration due to extraction of raw material and production. (Table 4.5.1 (a)).

According to our survey results, respondents are highly aware of terms such as Burning of fossil fuels with 98% (64% having Technical education and 34% of non-technical education, responses are non- significant), industrial pollution with 88% awareness (54 % having technical and 28% having non-technical education, responses are non-significant), Environmental deterioration due to rise in temperature with 78% awareness (48% having Technical education and 30% of non-technical education, responses have significant difference).

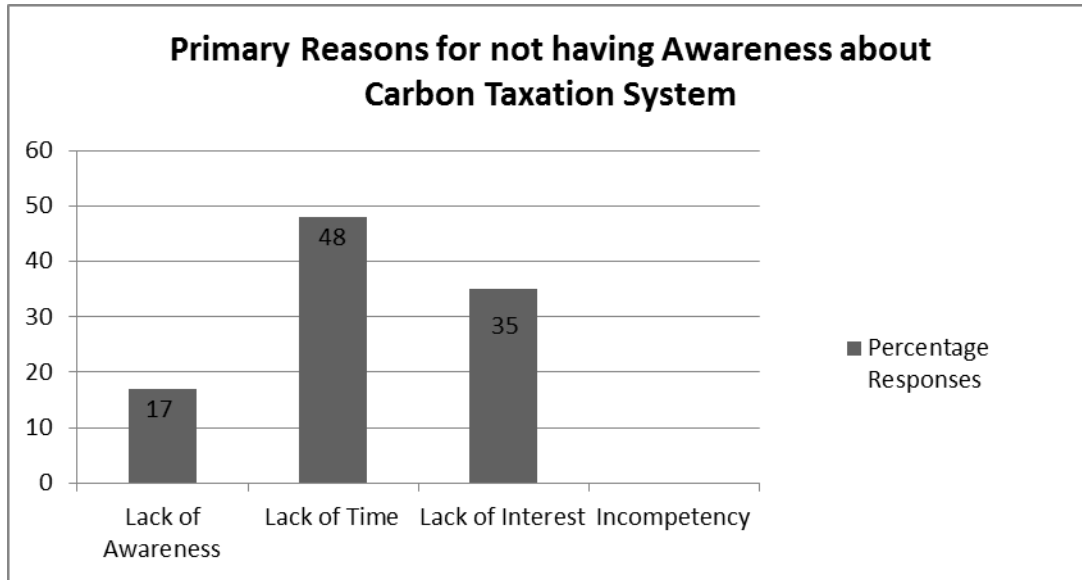
**Table 4.5.1 (a)**

**Responses to Yes/No Questions (Education as Grouping Variable)**

Questions	Responses		Grouping Variable	p-Value
	Yes	No		
<b>Are you Aware off Burning of fossil Fuel (Coal, Oil, Gas)?</b>	67	1	Technical Education	0.245
	35	2	Non-Technical Education	
<b>Are you aware of Industrial Pollution?</b>	56	12	Technical Education	1.33
	29	8	Non-Technical Education	
<b>Are you aware of Carbon Emissions?</b>	43	25	Technical Education	0.012
	23	14	Non-Technical Education	
<b>Are you aware of Carbon Pricing?</b>	15	53	Technical Education	2.045
	4	33	Non-Technical Education	
<b>Are you aware of Green Growth?</b>	19	49	Technical Education	1.81
	6	31	Non-Technical Education	
<b>Are you aware of Environmental Deterioration by Extraction of raw material?</b>	33	35	Technical Education	0.00
	18	19	Non-Technical Education	

<b>Are you aware of Environmental deterioration due to rise in temperature?</b>	50	18	Technical Education	1.75
	30	7	Non-Technical Education	
<b>Is Carbon Taxation system acceptable in Pakistan?</b>	65	3	Technical Education	1.680
	37	0	Non-Technical Education	
<b>Should Carbon Tax impose on Mton CO2 emissions is acceptable?</b>	45	23	Technical Education	0.018
	24	13	Non-Technical Education	
<b>Should Carbon Tax Impose on Products acceptable?</b>	7	61	Technical Education	0.007
	4	33	Non-Technical Education	
<b>Should Tax Impose on Fuel Consumption acceptable?</b>	16	52	Technical Education	0.008
	9	28	Non-Technical Education	
<b>Is Reduce Income Tax preferable recycle form of revenue?</b>	42	13	Technical Education	0.148
	24	6	Non-Technical Education	

However, respondents are moderately aware of carbon emissions with 69% awareness level (44% having Technical education and 22% of non-technical education, responses have significant difference). And least aware of Carbon pricing with 17% (14% having Technical education and 3% of non-technical education, responses are non-significant), green growth with 24% (18% having Technical education and 6% of non-technical education, responses are non-significant), environmental deterioration due to extraction of raw material with 48% (32% having Technical education and 16% of non-technical education, responses have significant difference). As a result, respondents are very less aware of specific terms of carbon pricing, Environmental deterioration due to carbon emissions and extraction of raw material and production (Table 4.2). When the respondents were asked about "reason of unawareness with carbon taxations", 48% respondents identify lack of interest as primary reason for not having awareness about carbon tax, 17% respondents said due to lack of time they did not have adequate awareness of carbon tax and 35% said due to lack of interest they less know about carbon tax.(fig 4.5.1(a)).



**Figure 4.5.1 (a) Primary reasons for not having awareness of carbon tax**

Apart from questions related to awareness, the questions pertained to acceptance of carbon taxation system were also asked. According to survey results, majority of respondents have shown high level of acceptability (divided opinion among 64% having technical education and 34% having non-technical education), (table 4.6.2). Furthermore, respondents were asked about preferable scenario of carbon taxation either it should impose on fuel consumption or million ton carbon emissions or final products. Consequently, 66% (44 % having technical and 22% having non-technical education, responses have significant difference) chose carbon tax should apply on Million ton of carbon emissions, 22% (14 % having technical and 8% having non-technical education, responses have significant difference) choose carbon tax should impose on fuel consumption, 52% (41 % having technical and 21% having non-technical education, responses are non-significant) response were “reduce income tax Should preferable recycle form of revenue” and only 10% (7 % having technical and 3% having non-technical education, responses have significant differences) responses were it should impose on final products. So it is clear from results the majority of responses about its imposition on Mton of carbon emissions. In addition to the above findings, the responses of awareness and acceptances questions are observed by using Experience as grouping variable and that are enlisted in table 4.5.1(b).

**Table 4.5.1 (b)**

**Responses to Yes/No (Nominal) Questions (Job Experience as Grouping Variable)**

Questions	Responses		Grouping Variable	p-Value
	Yes	No		
<b>Are you aware of Burning of fossil Fuel (Coal, Oil, Gas)?</b>	30	1	High Experience	0.003
	72	2	moderate Experience	
<b>Are you aware of Industrial Pollution?</b>	25	6	High Experience	0.022
	60	14	moderate Experience	
<b>Are you aware of Carbon Emissions?</b>	16	15	High Experience	2.3820
	50	24	moderate Experience	
<b>Are you aware of Carbon Pricing?</b>	4	27	High Experience	0.800
	15	59	moderate Experience	
<b>Are you aware of Green Growth?</b>	8	23	High Experience	0.0970
	17	57	moderate Experience	
<b>Are you aware of Environmental Deterioration by Extraction of raw material?</b>	13	18	High Experience	0.775
	38	36	moderate Experience	
<b>Are you aware of Environmental deterioration due to rise in temperature?</b>	22	9	High Experience	0.6100
	58	16	moderate Experience	
<b>Is Carbon Taxation system acceptable in Pakistan?</b>	29	2	High Experience	2.0480
	73	1	moderate Experience	
<b>Should Carbon Tax impose on Mton CO2 emissions is acceptable?</b>	22	9	High Experience	0.5300
	47	27	moderate Experience	

<b>Should Carbon Tax Impose on Products acceptable?</b>	5	26	High Experience	1.4900
	6	68	moderate Experience	
<b>Should Tax Impose on Fuel Consumption acceptable?</b>	4	27	High Experience	2.884
	21	53	moderate Experience	
<b>Is Reduce Income Tax preferable recycle form of revenue?</b>	22	4	High Experience	1.048
	44	15	moderate Experience	

### 4.5.2 Acceptance of Carbon Taxation System by Industries

Majority of respondents having technical education shows high (65%) acceptability about carbon taxation system. Close to half (42%) respondents having technical education said it should impose on million ton carbon dioxide emissions is acceptable for industries, only 7% respondents said it should impose on product is acceptable, 16% agreed with tax impose on fossil fuel consumption is acceptable for industries and close to half of respondents agreed reduce income tax is a preferable recycle form of revenue (Figure 4.5.2.a).

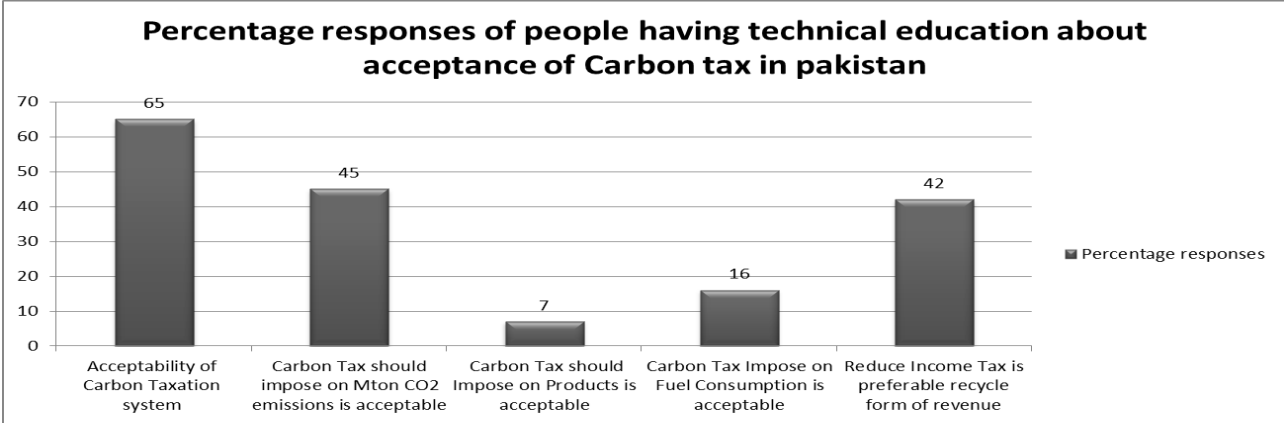


Figure 4.5.2. (a) Percentage Reponses of people having technical education about acceptance of carbon taxation system



More than one third of respondents having non-technical education shows (37%) acceptability about carbon taxation system. Nearly one fourth (24%) respondents having non-technical education said it should impose on million ton carbon dioxide emissions is acceptable for industries, only 4% respondents said it should impose on product is acceptable, 9% agreed with tax impose on fossil fuel consumption is acceptable for industries and close to one fourth respondents agreed reduce income tax is a preferable recycle form of revenue (Figure 4.5.2(b)).

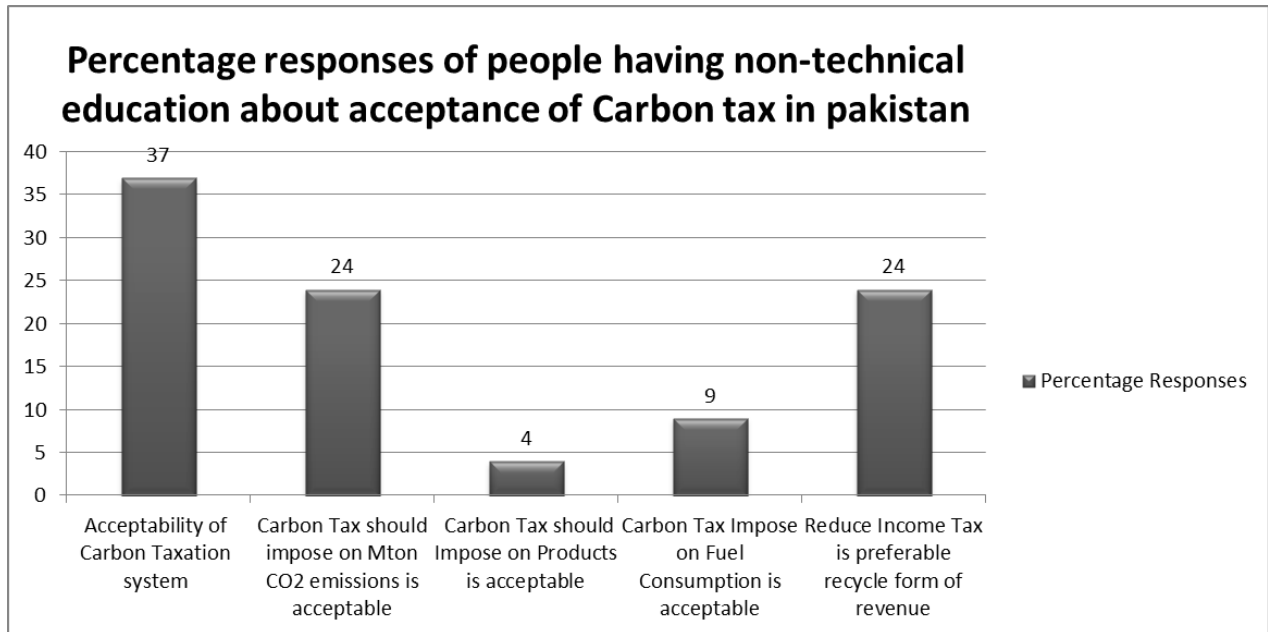


Figure 4.5.2. (b) Percentage Reponses of people having non-technical education about acceptance of carbon taxation system

### 4.5.3 Effect of Acceptance of Carbon Taxation System towards Age, Education, Experience and Awareness variables

We further explored respondent attitudes (dependent variable) towards acceptance of carbon taxation technologies within certain socio-demographic variables ( $X_1$ =Age of Respondents,  $X_2$ =Education of Respondents,  $X_3$ =Job Experience of Respondents) and awareness as independent variables using the binary logistic regression analysis. The coefficients of variables for awareness are ( $X_4$ =Awareness towards Fossil Fuel Consumption,  $X_5$ = Awareness towards Industrial Pollution,  $X_6$ = Awareness towards Carbon Emissions,  $X_7$ = Awareness towards Carbon Trading,  $X_8$ = Awareness towards Green Growth,  $X_9$ = Awareness towards Environmental

Deterioration due to Extraction of raw material and Production, X10= Awareness towards Environmental Deterioration due to rise in Temperature)

**Table 4.5.3 (a)**

**Detail of Statistical Analysis of variables in the Equation**

Variables	B	S.E.	Wald	Df	Sig.	Exp(B)	95% CI. for EXP(B)	
							Lower	Upper
<b>X1=Age of Respondents,</b>	-1.175	.894	1.727	1	.189	.309	.054	1.781
<b>X2=Education of Respondents,</b>	.178	.506	.123	1	.726	1.194	.443	3.222
<b>X3=Job Experience of Respondents</b>	.147	.883	.028	1	.868	1.158	.205	6.539
<b>X4=Awareness towards Fossil Fuel Consumption</b>	.614	.686	.802	1	.370	1.849	.482	7.092
<b>X5= Awareness towards Industrial Pollution</b>	.783	.584	1.796	1	.180	2.187	.696	6.870
<b>X6= Awareness towards Carbon Emissions,</b>	.390	.514	.577	1	.447	1.478	.540	4.045
<b>X7= Awareness towards Carbon Trading,</b>	-.644	.715	.810	1	.368	.525	.129	2.134
<b>X8= Awareness towards Green Growth</b>	1.223	.727	2.826	1	.093	3.396	.816	14.129
<b>X9= Awareness towards Environmental Deterioration due to Extraction of raw material and Production</b>	-.120	.558	.046	1	.830	.887	.297	2.646
<b>X10= Awareness towards Environmental Deterioration due to rise in Temperature</b>	-.722	.680	1.127	1	.288	.486	.128	1.842

Furthermore, the association between depended and independent variable is measured by adding B values and variables in equation in SPSS,

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_nX_m$$

Based on the Binary logistic regression results, respondents with low awareness of Carbon Taxation terms but more likely to have a positive attitude towards acceptance of carbon taxation system. This was an unexpected outcome with low awareness and high acceptability. It may contribute as strength for implementation of Carbon taxation system.

**Table 4.5.3 (b) CORELATION MATRIX**

	Age	Education	Experience	Aware of Burning of fossil fuels	Aware of Industrial Pollution	Aware of Carbon Emissions	Aware of Carbon Pricing	Aware of Green Growth	Aware of Environmental Deterioration of Extraction Raw Material and Production	Aware of Environmental Deterioration rise in Temperature
Age	1									
Education	-.093	1								
Experience	-.802	.179	1							
Aware of Burning of fossil fuels	.073	.048	-.031	1						
Aware of Industrial Pollution	-.029	-.009	-.002	.034	1					
Aware of Carbon Emissions	.033	.011	-.031	-.015	-.402	1				
Aware of Carbon Pricing	.056	.033	.067	.137	.048	-.019	1			
Aware of Green Growth	.213	-.112	-.144	-.120	-.005	.081	-.232	1		
Aware of Environmental Deterioration of Extraction Raw Material	-.104	-.004	.004	.013	-.005	-.134	.025	-.299	1	
Aware of Environmental Deterioration rise in Temperature	-.213	-.011	.197	.042	-.148	-.190	.075	-.334	.241	1

Correlation is significance at 0.05 level (Source: Data Analysis)



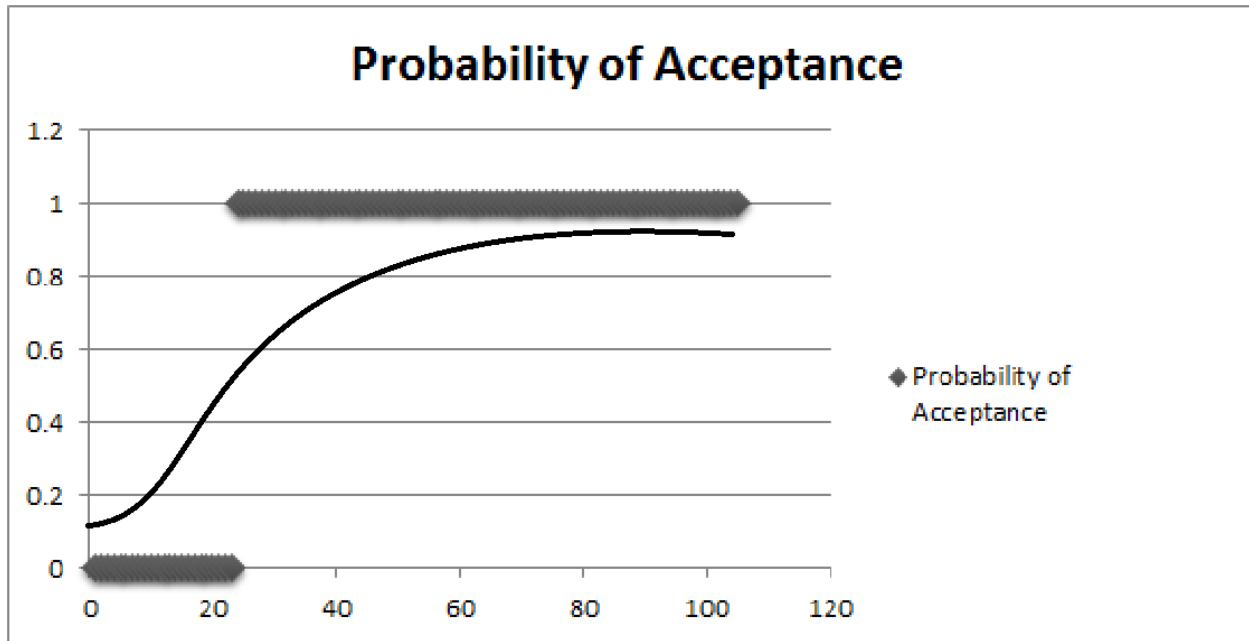


Figure 4.5.3 (b) Probability of acceptance of Carbon Taxation System

In results of Binary Logistic regression analysis, the correlation coefficient of dependent variable “Acceptance of Carbon Taxation System” with independent variables is 0.098 which is non-significant at 0.05 level of significance. The analysis of regression indicates that independent variable i.e. Acceptance of Carbon Taxation System in least square sense in the regression equation do in fact account for 2 % ( $r = 0.224$ ,  $r^2 = 0.054$ ) of dependent or predicted variable i.e. environmental awareness. Results are significant at 0.05 level of significance. Therefore the null hypothesis that is there is no relationship between dependent variable and independent variables is rejected at 0.05 level of significance.

$$Y = 1.089 + 0.138X_1 - 1.258X_2 + 0.198X_3 + 0.560X_4 + 0.767X_5 + 0.263X_6 - 0.484X_7 + 1.169X_8 - 0.156X_9 - 0.772X_{10}$$

P(Y) for each sample has shown in fig 4.5.3 (a), 4.5.3(b), mean value of predicted Probability is 0.78 which is greater 0.5 indicate the predicted acceptance of Carbon Taxation System by applying predictors of awareness, job experience, age and education. The value of 0.054 of r square i.e.  $r^2$  in the table indicates that 5% of dependent variable may be elucidated by the independent variables. Therefore remaining may be attributing to others variables. Probability in 0, 1 form has shown in fig 4.5.3 (b) (0=Unaccepted, 1=Accepted).

## 4.6 Impact of Carbon Taxation System on Industrial Relocation

Numerous significant geological components associated with the area of individual industry are of relative importance, e.g., accessibility of crude materials, power assets, water, work, markets and the vehicle offices. As for local industries of Lahore, Power sources (electricity), water and availability of labor is similar for all industries but distance from raw material to respective industry and market varies from industry to industry. These two geographical factors are important in sense of either it is feasible for an industry to stay here after implementation of Carbon Taxation system or it will relocate to a new location with less distance to raw material or market in order to reduce production cost and maintain their quality of production.

The meaning of raw materials in assembling industry is basic to such an extent that it needs no underscoring. Surely, the area of modern undertakings is in some cases decided essentially by area of the raw materials. Modern industry is unpredictable to the point that a wide scope of raw materials is vital for its development. Further we should remember that completed result of one industry likely could be the raw material of another. For instance, pig iron, delivered by refining industry, fills in as the crude material for steel making industry. Ventures which utilize weighty and cumbersome crude materials in their essential stage in huge amounts are normally situated close to the inventory of the raw materials. It is valid on account of raw materials which get more fit during the time spent production or which can't bear high vehicle cost or can't be moved over significant distances due to their transient nature. In Survey results it is find that majority of industries in random sampling having about 50 km distance from raw material to industry and 200 km is maximum average distance of an industry from raw material source (figure 4.6 (a)).

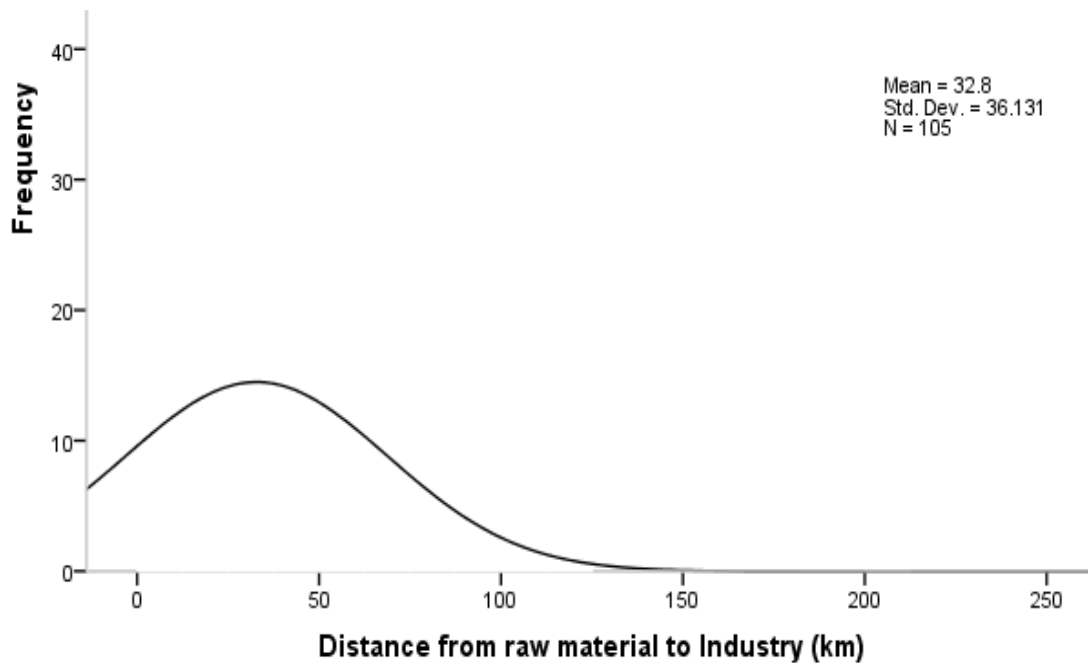


Figure 4.6. (a) Distance from raw material to Industry

Apart from distance from raw material to industry, distance from industry to market is also important for transportation cost because the whole interaction of assembling is futile until the completed merchandise arrive at the market. Proximity to showcase is fundamental for snappy removal of made products. It helps in lessening the vehicle cost and empowers the purchaser to get things at less expensive rates. It is turning out to be an ever increasing number of genuine that enterprises are looking for areas as close as conceivable to their business sectors; it has been commented that market attractions are presently incredible to the point that a market area is as a rule progressively viewed as the ordinary one, and that an area somewhere else needs solid avocation. Therefore, responses also collected about distance from industry to market. And results shows majority of industries in random sampling locally served within radius of 40 to 50 km (Figure 4.6 (b)).



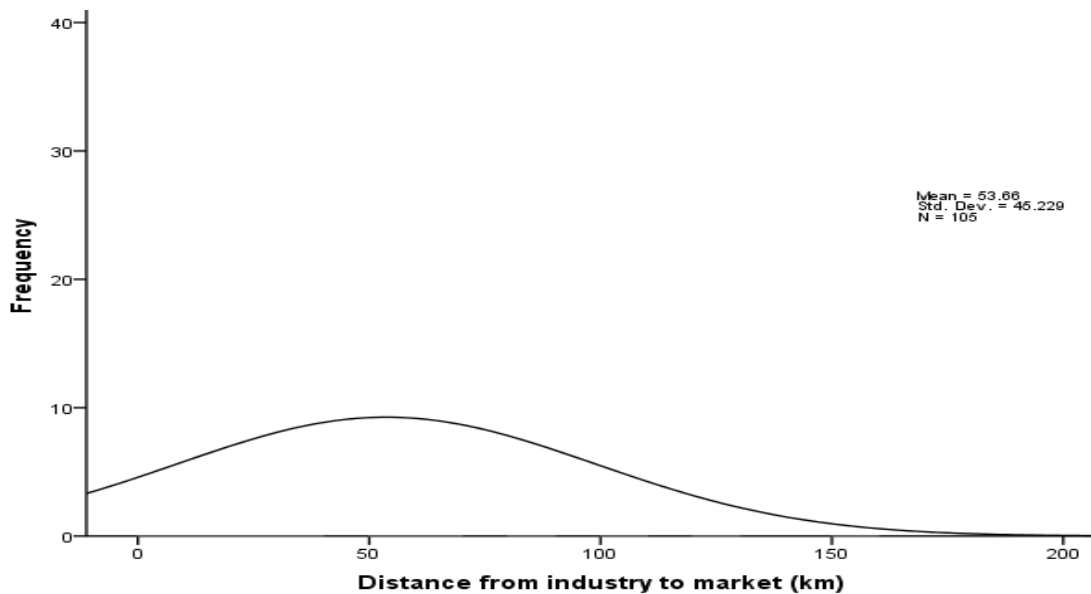


Figure 4.6 (b) Distance from Industry to Market

As majority of respondents show positive attitude about acceptability of carbon taxation system, therefore it is also asked by respondent that either they will stay here or move to any other location due to easy access to raw material, market and cheap labor after implementation of carbon taxation system for managing their level of production and quality of products. Respondents show enthusiasm for carbon taxation system and prefer to stay here. Results show that majority of respondents (94%) were in favor to stay here. Although with monetary turn of events and the difference in mechanical construction, industrial relocation is an inescapable pattern. During the time spent modern movement, ecological externality and social expense could happen because of market disappointment and government disappointment. The responses show local industries paid little consideration to this issue. Any industry could move to another city or country if such migration involves a critical administrative, locational or cost advantage. The locational benefits incorporate diminished transportation time because of nearness to crude materials or market, market size or far better everyday environments at the objective. The expense benefits, then again, incorporate lower input costs, better representatives or by and large lower cost of working together, while the

administrative benefits may cover tax cuts, strategy impetuses, less rigid controls, and so forth. Therefore it can be said that the imposition of a carbon taxation system has negligible impact on industries because industries can bear this tax and do not want to relocate. Although CPEC provides agglomerations of industries under special economic zones (SEZ) and provides better advantages for textile and garment industries, but here the responses reveal the less impact of such advantageous opportunity on industrial relocation of Lahore metropolitan city.

#### **4.7 Socioeconomic Impacts of Carbon taxation systems on local Industries**

The global warming and climate change have acquired a great deal of consideration lately, since these marvels lead to financial shakiness in present day culture. Humanity is presently very much aware of the unsafe impacts brought about by ecological discharges. Therefore, examination into strategies for decreasing natural discharges is of most extreme significance. Implementation of Carbon taxation system has its social impacts e.g. on Poverty, health, employment, Saving, family expenditures, Buying power, Uplifting of economic conditions etc. and economic impacts e.g. in terms of price and productivity as well. The survey responses about social, economic and spatial impacts of introduction of carbon taxation system are interpreted and social impacts measured by Social impact indices method (Table 4.7). These are measured as low medium or high. The responses on Likert scale are transformed into 0 to 1 value and their total is categorized into low, medium and high impact values.

**Table 4.7**

**Calculated YIS values of social indicators (Social Impact Index)**

<b>Indicators</b>	<b>NO affect</b>	<b>Minor affect</b>	<b>Neutral</b>	<b>Moderate affect</b>	<b>Major affect</b>	<b>Transformed value /YIS Value</b>	<b>Social Impact (&lt;0 Low, 0-1 Moderate, &gt;0 High)</b>
<b>Health</b>	4	17	9	42	32	-4.6	Low and adverse
<b>Employability</b>	14	19	37	22	13	-2.8	Low and adverse
<b>Poverty</b>	18	25	26	30	16	-4.2	Low and adverse
<b>Buying Power</b>	17	9	18	31	30	1.4	High and positive
<b>Climatic Conditions</b>	8	7	20	40	30	-1.8	Low and adverse
<b>Family expenditures</b>	21	18	35	22	9	-2	Low and adverse
<b>Savings</b>	17	8	24	31	25	0.6	Medium
<b>Quality of Products</b>	8	9	23	34	30	-1	Low and adverse
<b>Living standards</b>	10	8	21	33	32	0.2	Medium
<b>Green Energy Products</b>	3	10	7	47	38	-3.2	Low and adverse
<b>Preservation of Environment</b>	5	9	16	34	41	0.6	Medium
<b>Uplift Economic condition</b>	23	4	19	35	20	0.8	Medium

On the basis of observed and calculated values, the values of health, poverty and employability, Use of green energy products, climatic condition, family expenditures and quality of products are less than zero. Which identified the negative and adverse impact of carbon taxation system on these social indicators and here government need intervention in form of subsidy or any other policy implications. Similarly values of savings, living standards, preservation of environment and uplifting economic growth ranges from zero to one which is medium/moderate value that can be acceptable by simple or less modifications. On contrary, value of buying power is greater than one is higher impact values which identify the positive impact of carbon taxation system on buying power of industries. In results health, employability, poverty, climatic conditions, family expenditures, quality of products and green energy products needs much consideration in order to mitigate the adverse effect of carbon taxation system. And implementation of carbon taxation system will have positive impact on the buying power, living standards, preservation of environment and uplift economic conditions of industries.

#### **4.7.1 Impact on industrial employability**

Carbon tax is a useful asset for tending to environmental change that expands the cost of carbon dioxide-escalated products and ventures comparative with different merchandise and enterprises and uses market influences to diminish emanations covered by the arrangement. A focal factor for policymakers as they consider carbon estimating approaches (and different strategies all the more for the most part) is the effect on positions. Rivals frequently contend that carbon valuing contrarily impacts the work market and prompts work misfortune. Notwithstanding, the genuine impacts of carbon valuing on the work market are undeniably more perplexing than a straightforward bookkeeping strategy; one basic exercise is that positions will in general be redistributed instead of lost totally. This explainer draws from the writing on the business effects of ecological arrangement to address a significant strategy question: how do (or will) carbon valuing approaches influence work?

One of the unmistakable takeaways from the writing on economic impacts of natural arrangement, and carbon evaluating explicitly, is that strategies will in general reason a redistribution of work (a move of occupations starting with one area then onto the next) as opposed to net additions or misfortunes in positions. The discoveries propose that a large number of the positions lost in dirtying businesses because of a cost on carbon, for example, occupations at petroleum derivative force plants, are supplanted by new openings in non-contaminating enterprises, for example, sustainable power plants or administration ventures. Along these lines, economy-wide joblessness levels are not expected to be altogether influenced via carbon costs and the progressions that do happen are relied upon to be unimportant comparative with average business-cycle variances in the work market. The impact of carbon tax on employability is complex (positive in some scenarios and negative in other scenarios).

The survey results depict low and adverse impacts of carbon taxation system on employability with negative transformed value (Table 9) in views of industries. Industrial responses are frequently neutral about impacts of carbon taxation system on industrial employability, and about one fifth (20%) responses are about minor and same about moderate impact of carbon taxation system on industrial employability. But the transformed value demand the consideration of government about industrial employability after implementation of carbon taxation system in Lahore Case study. Although there are a lot of reasons which affect the industrial employability e.g. natural disasters, Floods 2010, 2011 but government initiatives mitigate the adverse impacts on employability.

#### **4.7.2 Impact on poverty**

In random sampling, poverty is second frequent ranked issue as discussed above in detail. Whereas, when industries are asked to rank the impact of carbon taxation system on poverty on five point likert scale, one fourth (25%) responses are neutral, slightly below one fourth are minor impact of carbon taxation system on poverty, and slightly above one fourth responses are about moderate impacts of carbon taxation system on poverty. Almost one sixth responses (14%) are about no effect and almost same (15%) about high impact of carbon

taxation system on poverty. Whereas the transformed value is negative, which depict the adverse impact of carbon taxation system on Poverty. The results are based upon industrial response therefore on the basis of findings it can say that industries are much threatened with poverty issue.

### **4.7.3 Impact on consumer's buying power**

A purchaser's purchasing power addresses their capacity to make buys. The economy influences purchasing power. For instance, if costs decay, buyers have more noteworthy purchasing power. In the event that the estimation of the dollar expands comparative with unfamiliar money, shoppers have more noteworthy purchasing influence. At the point when swelling/inflation happens, buyers have less purchasing power. In economic perspective, the tax revenue may useful in strengthening currency and buying power. And survey responses also strengthened this interpretation as in random sampling of 105 industries of Lahore metropolitan area (table 9), when industries are asked to rank the impact of carbon taxation system on buying power on five point likert scale, one sixth (16%) responses are neutral, slightly below one third (30%) are moderate impact of carbon taxation system on buying power, and about same are about major impacts of carbon taxation system on buying power. Almost one sixth responses (14%) are about no effect and very few (7%) about minor impact of carbon taxation system on buying power of consumers. Whereas the transformed value is positive, which depict the high and positive impact of carbon taxation system on consumer's buying power.

### **4.7.4 Impact on Environmental Preservation**

A environmental preservation is the act of ensuring the common habitat by people, associations and governments. Its destinations are to moderate common assets and the current regular habitat and, where conceivable, to fix harm and opposite patterns. In socioeconomic perspective, the environmental preservation is an important phenomenon in implementation

of carbon taxation system on industries. And survey responses also strengthened this interpretation as in random sampling of 105 industries of Lahore metropolitan area (table 9), when industries are asked to rank the impact of carbon taxation system on environmental preservation on five point likert scale, above one third (14%) responses are neutral, one third (33%) are moderate impact of carbon taxation system on environmental preservation, and above one third (40%) are about major impacts of carbon taxation system on environment preservation. Very few responses (4%) are about no effect and (7%) about minor impact of carbon taxation system on environment preservation. Transformed value is ranging between zero to one which depict the medium impact of carbon taxation system on environmental preservation.

Environmentally friendly power is helpful energy that is gathered from sustainable assets, which are normally renewed on a human timescale, including carbon impartial sources like daylight, wind, downpour, tides, waves, and geothermal heat. The term regularly incorporates biomass also, whose carbon unbiased status is under banter. This sort of fuel source remains as opposed to petroleum derivatives, which are being utilized definitely more rapidly than they are being recharged. And in survey responses of random sampling (table 9), when industries are asked to rank the impact of carbon taxation system on use of green energy products on five point likert scale, very few (6%) responses are neutral, nearly half (46%) are moderate impact of carbon taxation system on green energy products, and above one third (37%) are about major impacts of carbon taxation system on green energy products. Very few responses (2%) are about no effect and (9%) about minor impact of carbon taxation system on green energy products. Transformed value is ranging between zero to one which depict the medium impact of carbon taxation system on use of green energy products.

#### **4.7.5 Impact on climate conditions**

Climate conditions remembers every one of the varieties for the environment that last more than singular climate occasions, though the term environmental change just alludes to

those varieties that persevere for a more drawn out timeframe, normally many years or more. And survey responses in random sampling of 105 industries of Lahore metropolitan area (table 9), when industries are asked to rank the impact of carbon taxation system on climate conditions on five point likert scale, one fifth (20%) responses are neutral, above one third (39%) are moderate impact of carbon taxation system on climate conditions, and slightly below one third (29%) major impacts of carbon taxation system on climate conditions. Almost few responses (7%) are about no effect and very few (6%) about minor impact of carbon taxation system on climate conditions. Whereas, the transformed value is negative, which depict the low and adverse impact of carbon taxation system on climate conditions.

**4.7.6 Impact on price and quality of product**

In Response to the question asked about what is impact of 1\$per ton of carbon emissions on price of products, more than half of respondents said yes it will impact on price of products, reaming slightly above one third (38%) said no and few not know about it. whereas few ones (11.5%) said they do not have knowledge of such terminologies.

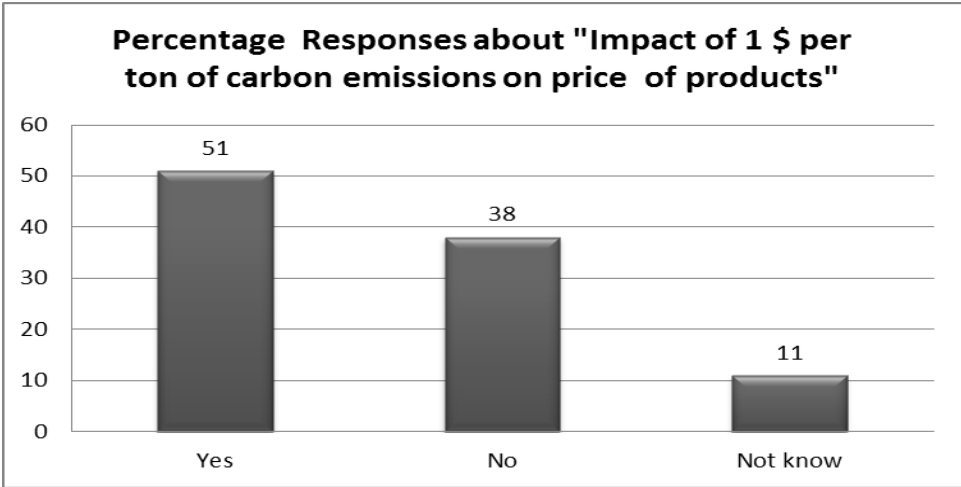


Figure 4.7.6 Impact of 1\$ per ton of carbon emissions on price of products (Source: survey)

Along these lines, item quality alludes to the all out of the decency of an item. The item should be planned according to the customers' necessities and great principles. Quality conformance is the completed items should adjust to the item plan determinations. And in



survey responses of random sampling (table 4.7.6), when industries are asked to rank the impact of carbon taxation system on quality of products on five point likert scale, slightly above one fifth (22%) responses are neutral, nearly half (46%) are moderate impact of carbon taxation system on quality of products, and nearly one third (32%) are about major impacts of carbon taxation system on quality of products. Very few responses (7%) are about no effect and (8%) about minor impact of carbon taxation system on quality of products. Transformed value is ranging negative which depict the adverse impact of carbon taxation system on quality of products.

### 4.7.7 Impact on Labor Cost of product

Labor cost is one of most important factors of production and In Response to the question asked about can implementation of carbon tax effect the labor working in industries, more than half of respondents said no effect on labor working in industry and reaming 38% said it will affect the labor working in industry (Figure 4.7.7).

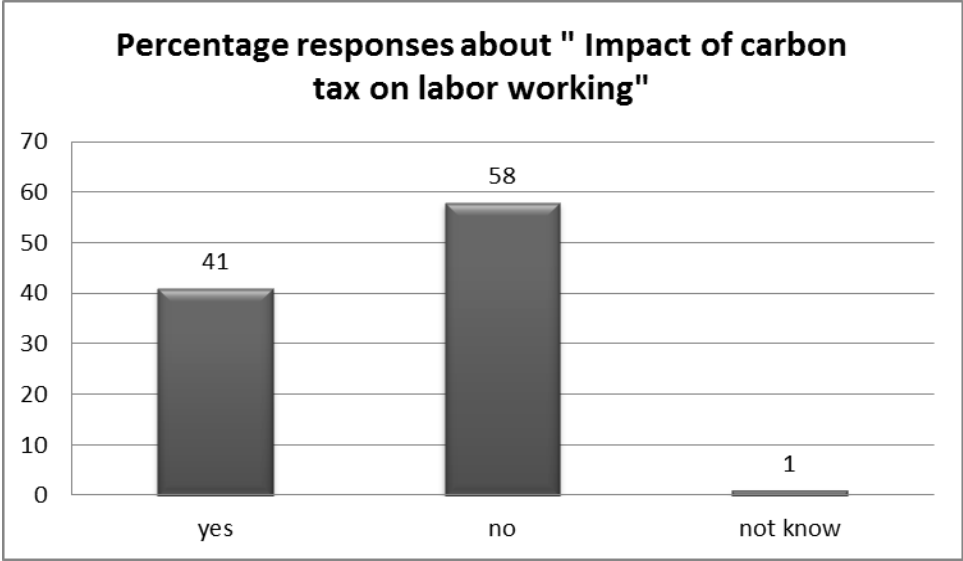


Figure 4.7.7 Impact of Carbon tax on working labor

## 4.7.8 Macro Impacts

### 4.7.8.1 Subsidy for Green Growth

In response to the question asked about the availability of any tax assumption and tax relief policy from government, the 100 % responses were “Not availing”. Similarly when they were asked “Should government provide subsidy for implementation of green growth projects” 100 % responses were in its favor. As a result it can say if government provide subsidy for implementation of green growth, the industries can well supported from government for effective implementation of green growth strategies and can protect Environment.

### 4.7.8.2 Preferable rate and recycle form of Carbon tax

According to survey result the level of acceptability of carbon taxation system is 97% which is much higher. Apart from the level of acceptability the respondents were also asked about preferable rate of carbon tax and responses are shown in figure 4.7.8.2. According to results majority of responses (80%) were “ Preferable rate for carbon tax should be lower than 1 US\$ per Mton of CO<sub>2</sub> Emission”.

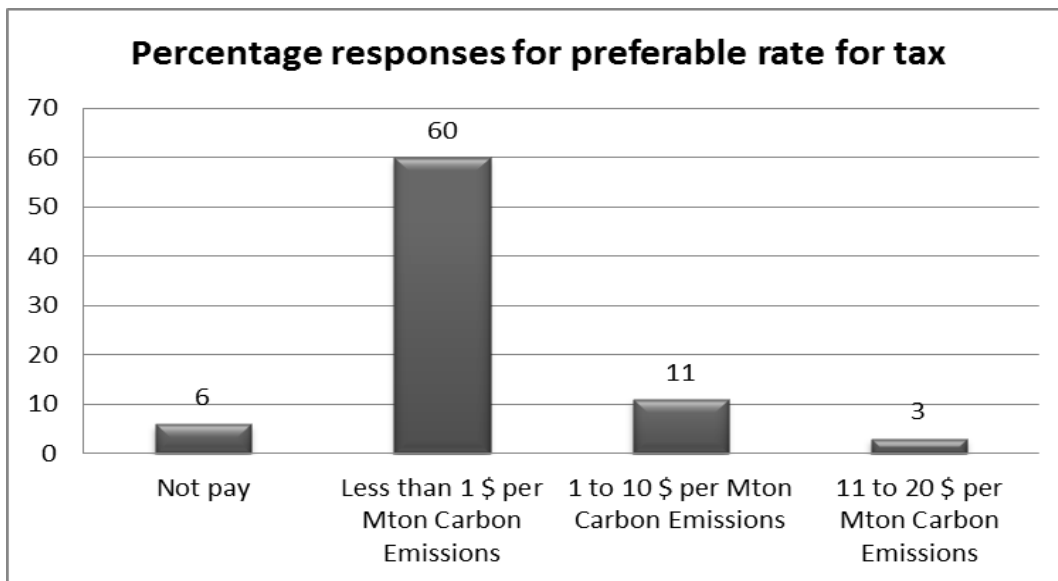


Figure 4.7.8.2 (a) Percentage responses for preferable rate for carbon tax

Similarly the question about preferable recycle form of revenue was asked, and the maximum responses (62.9%) were reduce income tax should be preferable recycle form of revenue. Apart from this option 18% responses were revenue raised should not recycle within Pakistan and 19% responses were revenue should use to raised general governmental expenditures (Figure 4.7.8.2).

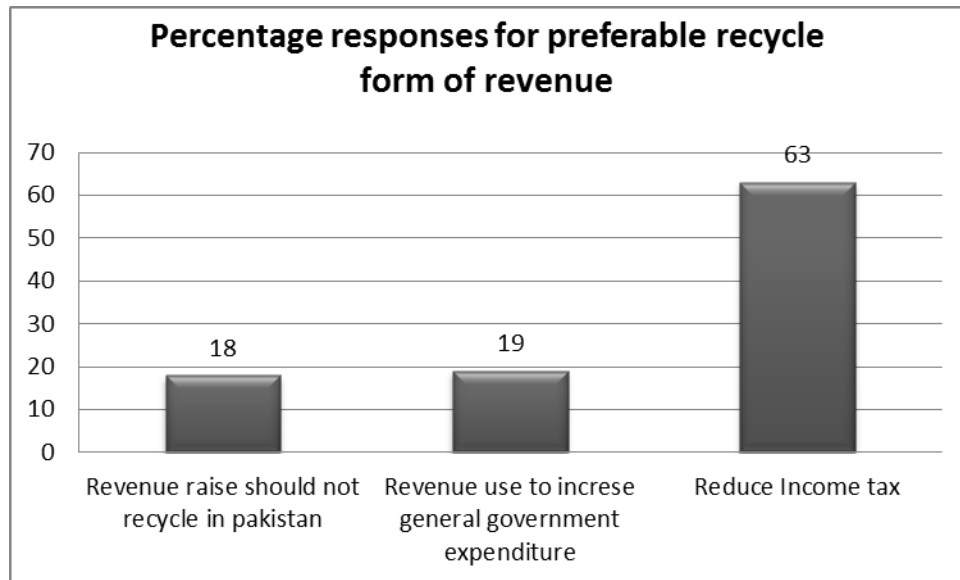


Figure 4.7.8.2 (b) Percentage responses for preferable recycle form of revenue

## 4.8 Barriers and Drivers for Implementation of Carbon Taxation System

A carbon tax is an expense that an administration forces on any organization that copies fossil fuels. The most broadly examined are coal, oil, gas, and gaseous petrol. At the point when these carbon-rich powers are singed, they produce ozone harming substances. These gases, like carbon dioxide and methane, make an unnatural weather change by warming the air. The resultant environment disturbance causes outrageous climate, for example, heat waves, flooding, snowstorms, and dry seasons.

### Pros:

- The additional expense lessens emanations by propelling purchasers to look for cleaner energy
- Lifts monetary development by considerably expanding government income
- Assets organizations overseeing environmental change impacts

**Cons:**

- A carbon charge is backward
- An unexpected expansion in a carbon assessment would stun the economy
- It punishes the individuals who can't change to options

**Benefits:**

The cost diminishes surges twofold. In any case, extending the cost of carbon-based stimulates will convince associations to change to clean energy. These fuse sun situated energy, wind energy, and hydro-energized sources. The carbon cost will similarly assemble the expense of fuel and force. Purchasers will by then become more energy-powerful, further decreasing ozone draining substance releases. Charges grant undertakings to find the most down to earth ways to deal with lessen non-renewable energy source results. That is a better decision than unhindered economy economies than informal law. A carbon charge moreover helps monetary turn of events. A carbon charge raises liberal pay. The pay can reimburse government associations endowed with dealing with the effects of natural change. .

**Disservices:**

A carbon charge is backward. By making petroleum products more costly, it forces a harsher weight on those with low salaries. They will pay a higher level of their pay for necessities like gas, power, and food. They can't stand to change to electric vehicles.

The Strengths, Weaknesses, Opportunities and Threats for implementation of carbon taxation system are well listed in SWOT Analysis table 4.8.

**Table 4.8**

**SWOT ANALYSIS (Source: Field Survey)**

<b><u>Strengths:</u></b>	<b><u>Weakness:</u></b>
<ol style="list-style-type: none"><li data-bbox="240 636 797 1136">1. Working staff and consumers of industries are local people having positive attitude towards protection of local environment. Their willingness for adoption of carbon taxation system is strength in effective implementation of carbon taxation system. Their enthusiasm for environmental protection may bring efficient output.</li><li data-bbox="240 1220 797 1486">2. The Consciousness of industries about High Quality Production and assurance of products standard may cause adoption of Carbon taxation system as it enhance the standard of production</li><li data-bbox="240 1570 797 1837">3. Industries are much concerned about use of energy efficient machinery and this trend of use of efficient machinery in production process may focus on energy efficient production process.</li></ol>	<ol style="list-style-type: none"><li data-bbox="881 636 1386 842">1. Due to low income and low Investment, the effective implementation of carbon taxation system can impede.</li><li data-bbox="881 926 1425 1251">2. Because of low availability of energy efficient appliances, the implementation of Carbon Taxation system can be difficult. As industries find difficulties in reduction of Carbon Emissions.</li><li data-bbox="881 1335 1430 1486">3. Low availability of staff in industries is another weakness in industrial system for effective implementation.</li><li data-bbox="881 1570 1382 1776">4. Lack of awareness about carbon taxation and other Green Energy sources may leads to difficulties in implementation.</li></ol>

<p>Inter industries competition may help the adoption of green energy sources, and tools to control emission e.g. Carbon Taxation system</p> <p>4. Industrial workers give very positive responses therefore this positive attitude of Energetic and hardworking workers of industries.</p> <p>5. All Industries are local in nature and distances from raw material to industries and distance from industries to market is also manageable distance. These Shorter t moderates distance from distances may force to avoid industrial relocation and effective adoption of carbon taxation system</p>	<p>5. Similarly lack to new technology in existing scenario is also a weakness for effective implementation.</p> <p>6. The survey responses depict that there is an absence of emerging plans in Industries growth. which can be weakness in adoption of carbon taxation system</p>
<p><b><u>Opportunities:</u></b></p> <p>1. Good Economic conditions e.g. Easy Access to market, Profitable production (High Demand) and increasing revenue etc. is an opportunity for industries for effective implementation of Carbon Taxation System.</p> <p>2. High completion is another opportunity which may lead to increasing use of</p>	<p><b><u>Threats:</u></b></p> <p>1. Changing Governmental policies may hinder or threaten the well-functioning of system.</p> <p>2. Electricity shortage and the trend of use of fuel as alternative energy sources is another thread</p> <p>3. Epidemic or other disasters may</p>

<p>energy efficient sources and for implementation of Carbon Taxation System.</p> <p>3. High familiarity and use of solar energy is an opportunity for implementation of carbon taxation system</p>	<p>threat the functioning of industries which can disturb the implementation of carbon taxation system.</p> <p>4. Sudden change in prices of fuel ( which can affect the output) may threaten the implementation of carbon taxation sy</p>
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## Chapter 5

### CONCLUSION AND RECOMENDATIONS

The Industrial sectors of Pakistan represent the milestones and challenges that many countries in South Asia encounter as they strive to set up green and inclusive economies. As Pakistan seeks to increase its renewable energy portfolio, there is a need to consider public participation. Towards this goal, we performed a case study survey of 105 industries of Lahore to investigate acceptance, awareness, and attitudes towards acceptance of carbon taxation in Pakistan. This study supports the view that public opinion, especially on matters regarding the adoption of a carbon taxation system, should be closely monitored by the public and is one of the first of its kind that went further to include an analysis establishing a relationship between awareness and acceptability. The main conclusions from our survey can be summarized as follows.

from an Industries point of view, poverty and poor economic conditions, environmental degradation and heavy taxation are major problems facing Pakistan nowadays. Lahore's respondents of a wide demographic spectrum show low awareness for carbon taxation-related terms as the most popular policy option for green energy was the only solar energy and 3% industries responses operating energy-efficient projects. Similarly, the results clearly show the absence of strategies for green growth in industries. But there is a positive attitude towards acceptance of the carbon taxation system in Pakistan (68.6%). The low awareness about carbon tax-related terms in a case study is caused by not having adequate knowledge of Carbon tax-related terms are the lack of interest, lack of time, lack of interest. Although the industrial sector is least aware of carbon tax related-terms they understand the adverse environmental impacts in form of air pollution and smog in Lahore. Therefore they show a high level of acceptability of the carbon taxation system as results show there is a significant relationship between acceptability and age, experience, awareness variable.

In Additions, half of the responses show an impact of carbon taxation on price, productivity, and working labor in industries. Carbon taxation systems can least impact



industrial relocation (94% of responses were to stay here after implementation of tax). As results indicate, heavy taxation is one of the top 3 biggest issues facing Pakistan, therefore to meet the needs of the poor from industrial products, there should be a balance between tax rate and subsidies and according to industries responses reduce income tax can be a preferable recycle form of carbon tax revenue.

Overall, this study has revealed that there is overwhelming support towards acceptance of the carbon taxation system in the country, with some small socio-demographic segments of the population having neutral or negative attitudes towards its acceptance.

Consequently, Pakistan should strengthen its policy initiatives to focus on engaging the public in the adoption of a carbon taxation system in the country to provide a healthy environment to its growing population. As the Carbon taxation system will bound the industries to control their emission if it's done with industrial consult then it becomes easy to socially accept and enforce.

Apart from this study the next study might of engaging the public will be to require their input in the process of assessing the benefits of different attributes of the carbon taxation system such as impacts on the environment, job creation, distance and visibility, and ownership. The study serves to further highlight the existing barriers that limit public input in the larger context of acceptance of the carbon taxation system in south Asia. The nature of the barriers is the traditional paradigms involving top-down policy approaches that limit the inclusion of public views. This implies that policy formulation should follow an active inclusion approach where these regional blocks, governments, researchers, and citizens must cooperate.

To meet the goals of low emissions, it is critical to collect, analyze and interpret public views for the formulation of robust policy. The Pakistan public policy outcomes should be geared towards, reinforcing public support for acceptance of the carbon taxation system by increasing literacy through the most appropriate source of media. Even so, the finding from this study underscores the need to scale up similar carbon tax studies in other developing countries. The collective knowledge from the public will assist in designing coherent policies that will

safeguard the environmental, social, and economic interests of the country with reduction of emissions should be a goal, especially with recognized carcinogens.

## **RECOMMENDATIONS**

The Government of Punjab (GoP) should put economical industrialization at the focal point of its development methodology and ought to modernize its arrangement tool stash, for this reason, Building up an aggressive and coordinated approach to green ventures would be an essential method to mutually accomplish these targets, and in this manner, Punjab could turn into a beacon for the remainder of Pakistan. This would require both reinforcing the natural approach (stick) and creating components of a green mechanical strategy taking a gander at speculation, development, and exchange (carrot). Significantly, strategy targets should go past the current spotlight on contamination control and consistency, to incorporate preventive and roundabout methodologies at the firm and industry levels that could yield ecological and efficiency/seriousness gains. The opportunity has arrived to coordinate these methodologies in systems and guidelines, and to organize and standard them across significant government

## ANNEXURE

**Table 5.0**

**Impacts of Industrial Growth (thematic areas, parameters and indicators)**

		<b>IMPACTS OF CARBON TAXATION ON LOCAL INDUSTRIES GROWTH</b> (Thematic Area, Parameters and Indicators)							
<b>Thematic Areas</b>	<b>Parameters</b>	<b>Indicators</b>							
<b>Economic</b>	<b>National Economic Growth</b>	FDI	GDP per Capital	Value added Shares	Dependancy Ratio	Wage Labor	Employment Rate	No of Enterprise	Growth Rate
	<b>Industrial Growth</b>	Industrial output Value	Industrial value added per capita	Manufacturing value added per capita	the ratio labor cost to sale	Capital Labor Ratio	Industrial GDP per capita	Net Value of Fixed assets	Growth Rate
	<b>Industrial Structure</b>	age of industry	size of industry	Proportion of heavy industry					
	<b>Market Structure</b>	Price Change of base metal	Operating Cost	Micro Credits	Fuel(Coil, oil, gas) price	Market Generation Share by fuel	Aggregate sale price index		
	<b>Industrial Production</b>	total financial revenue	Average Annual Earning from exports						
<b>Social</b>	<b>Human Cost</b>	No of Workplace Deaths/ Million Employees	Life Expectancy	Human Development Index					

	<b>Human Capital</b>	hourly Work Share	Population	Secondary school Enrolment rate	ODA Aggregate	Skilled Labor	Incentives/Rewards	Education level	
	<b>Health</b>	Poverty Status	Health Reforms	Hospital supply-beds	Hospital Supply-Doctors				
<b>Environmental</b>	<b>CO2 Emission</b>	CO2 intensity (t CO2 / 10000 years)	CO2 emissions (MtCO2)	total CO2 per total primary energy supply	CO2 Emission Demand	CO2 emissions per GDP,			
	<b>Energy Efficiency</b>	Energy intensity	Energy use per Capita /	Energy Consumption Million tons, tons or in other units)	energy consumption per GDP,	Technological Innovations	Water Consumption	Fuel( Coal, Oil, Gas) Consumption	Hybrid Energy Resources
	<b>Pollution</b>	Industrial air pollution	Total emissions	total stack quantity	Exposed population	Air Quality Index			
	<b>Spillover Effect</b>	Exposed population	wind speed						
	<b>Recycling</b>	Value of stack quantity reduction							
	<b>Green Growth</b>	Temperature Profile							
	<b>Institutional</b>	<b>EIA</b>	No of Recycled Products	Percentage use of renewable Resources	Water Quality Index				

	<b>Industrial Relocation</b>	Material Index Value	Labor Cost	Distance from Raw Material	Capital Labor Ratio				
	<b>CO2 Tax</b>	Carbon Pricing	CO2 emissions (MtCO2)	CO2 intensity (t CO2 / 10000 years)	CO2 emissions per GDP,				
	<b>Subsidies</b>	Bill Savings	Water Tariff	Electricity Tariff	Cost of Energy per HH				
	<b>Institutional Support</b>	No of Signed Protocols	No of skilled labors	Political Stability					
	<b>Sustainable Urban Development</b>	HH Size	rental income and total income ratio	Density	GDP per Unit area	Income Level	Urbanization level	Geo Industrial clustered ratio	Land Price
<b>Physical</b>	<b>Infrastructure</b>	Electric power Consumption	Aggregate fuel Consumption	Rail Lines (total Routes)	Secure Internet server (per 1 million people)	Air Transport, Registered Carrier Departures			

# QUESTIONNAIRE



*Department of Urban and Regional Planning*  
**NATIONAL UNIVERSITY SCIENCE & TECHNOLOGY, PAKISTAN**  
*(Affects on Energy Missing)*

## RESPONDENT PROFILE

<i>Name of Respondent</i>		<i>Age of Respondent</i>	
<i>Education of Respondent</i>		<i>Job Experience in Industry</i>	
<i>Designation of Respondent</i>		<i>Industries Location (Region and City)</i>	
<b>Contact details (Name, Organization, Email)</b>		<b>Date</b>	

## SECTION 1: PUBLIC AWARENESS ABOUT CARBON TAX

**1: Consider the following issues. What are the three most important issues facing the Pakistan today?**

(Terrorism, Taxes, Health care, Environment, Economy, Poverty, Unemployment, Aging population, Family values, Income inequality, Education, Federal budget, Deficit, Maternal Health, Foreign policy, Racism, Crime, Welfare, Social Security, Inflation, Drugs, Stock market etc.)

**2. Consider the following environmental problems. Which is the most important problem facing the Pakistan today?**

(Water pollution, Destruction of ecosystems, Toxic Waste, Overpopulation, Ozone depletion, Global warming, Urban sprawl, Smog, Endangered species, Acid rain)

**3: Many environmental issues involve difficult trade-offs with the economy. Which of the following statements best describes your view?**

1. The highest priority should be given to protecting the environment, even if it hurts the economy.
2. Both the environment and the economy are important, but the environment should come first.
3. Both the environment and the economy are important, but the economy should come first
4. The highest priority should be given to economic considerations such as jobs even if it hurts the environment.

**4: Have you heard of or read about any of the following in the past year? Check all that apply.**

(More efficient cars, Solar energy, Nuclear energy, Wind energy, More efficient appliances, Hydrogen cars, Bioenergy/biomass, Carbon Trading , Carbon Taxation , Iron fertilization, None of these)

**5: What is your level of familiarity about Carbon Taxation System?**

<i>Item</i>	Not at all familiar	Slightly familiar	Somewhat familiar	Moderately familiar	Extremely familiar
<i>Burning of Fuel (Coal, Oil, Gas)</i>					
<i>Industrial Pollution</i>					
<i>Carbon Emissions</i>					
<i>Carbon Pricing</i>					
<i>Green Growth</i>					

**6: What is your level of familiarity about the Environmental Deterioration caused by the production process of the product which you are using?**

<i>Item</i>	Not at all familiar	Slightly familiar	Somewhat familiar	Moderately familiar	Extremely familiar
<i>Extraction of Raw Material</i>					
<i>Fuel consumption</i>					
<i>Energy source</i>					
<i>Carbon Emission during Production</i>					
<i>Air Pollution Caused by Production</i>					
<i>Underground water quality degradation</i>					
<i>Rise in temperature</i>					

**7. There is a growing concern about increasing levels of carbon dioxide in the atmosphere. How do you think the following contribute to these levels?**

- a. Automobiles
- b. Factories
- c. Coal burning power plants
- d. Home heating
- e. Breathing
- f. Nuclear power plants
- g. Farming
- h. Trees
- i. Oceans
- j. Windmills

**8: Please select if “carbon Taxation System” can reduce each of the following environmental concerns.**

- a) Toxic waste
- b) Ozone depletion
- c) Global warming

- d) Acid rain
- e) Smog
- f) Water pollution

**SECTION: 2 INDUSTRIAL STRUCTURE**

1. *Name of Industry*

2. *Type of Industry*

3. *Production Level of Industry*

4. *What are Proportion of Heavy Manufacturing units in Industry?*

5. *Are you using any renewable Energy Resource or Energy Efficient Project? (Yes/No)*

6. *If Yes, What type of renewable sources?*

7. *Is there any treatment plant Operational in Industry? (Yes/No)*

8. *If Yes, How it reduce Carbon Emissions?*

9. *Are you paying any type of Environmental Tax, or tax on fuel and Energy source recently?(YES/NO)*

10. *If yes, what type of Environmental Tax, or tax on fuel and Energy source you are paying recently?*

11. *What is your Industrial Output Value?*

12. *What is Operating Cost of total Industrial Unit?*

13. *No of skilled Labor?*

14. *Level of Education of Employees?*
- a. Illiterate \_\_\_\_\_
  - b. Under Matric \_\_\_\_\_
  - c. Matric \_\_\_\_\_
  - d. Inter \_\_\_\_\_
  - e. Graduate \_\_\_\_\_
  - f. Post Graduate \_\_\_\_\_
  - g. Doctorate \_\_\_\_\_

15. *What is Total Financial Revenue?*



16. *What Kind of Environmental standards are you following?*

17. *What is total Electric power Consumption per month?*

18. *What is Average Annual Labor Cost?*

19. *What is Average Annual Sale?*

**SECTION: 5 CARBON FOOTPRINTS OF INDUSTRY**

1. *What is Area Served by Industry?*

2. *What is Average Annual Exports Products?*

3. *What is Proportion of FDI for your Industry?*

4. *What is Amount & Price of fuel used in industry?*

Coal \_\_\_\_\_

Oil \_\_\_\_\_

Gas \_\_\_\_\_

Other \_\_\_\_\_

5. *What are CO2 emissions (MtCO2) Annually?*

**SECTION:3 IMPACTS ON INDUSTRY, IN TREM OF PRICE AND PRODUCTIVITY**

1. *What is Impact of 1 \$ per ton of Carbon emissions on price of product?*

2. *Is this Carbon Tax can affect the labor working in your Industry? (YES/NO)*

3. *If yes, How in terms of following ways:*

item	NO affect	Minor affect	Neutral	Moderate affect	Major affect
Wages of Labor					
Demand of Labor					
Market of Labor					
Human Rights of Labor at work place					

4. **What you Think Implementation of Carbon Taxation System in Pakistan impact on social life of Citizens?**

- a. No affect      b. Minor affect      c. Neutral      d. Moderate affect      e. Major affect

item	NO affect	Minor affect	Neutral	Moderate affect	Major affect
Improve Health Condition of Citizens					
Increases Employment					
Reduce Poverty					
Increase Buying Power					
Improve adverse Climatic Conditions					
Decrease your monthly expenditures					
Increase your monthly Savings					
Increase Quality of Products					
Improve living standards					
Decrease Poverty					
Increase Green Energy					
Preservation of Environment					
Uplift Economic Growth of Country					

**5. Should Government Provide Subsidy for Green Growth?**

- a) Strongly Agree      b) Agree      c) Neutral      d) Disagree      e) Strongly Disagree

**6. Who are the consumers of your Industrial Product?**

**SECTION:4      SPATIAL EFFECTS OF INDUSTRY**

1. *What is distance from Raw Material to Industry (in km) ?*

2. *What is distance from Industry to Market (in Km )?*

3. *How Price Change of base metal impact your Market structure?*

4. *If Carbon Tax imposed on your Industry, will you stay here or move to any other location of cheap labor, near more competitive market structure or less distanced from raw Material to balance your production cost?(YES/NO)*

5. *If yes, where will you move?*

**SECTION: 5                    WILLINGNESS TO ADOPT CARBON TAXATION**

**1    *What is your level of Acceptability if Carbon Tax is imposed on your Industry?***  
a) Strongly Agree    b) Agree    c) Neutral    d) Disagree    e) Strongly Disagree

**2    *What Kind of Carbon Tax Scenario will you prefer to adopt?***  
a) Tax impose on Mton CO2 emissions  
b) Tax Impose on Usage of Fuel (Coal, Oil , Gas etc.)  
c) Tax Impose on Products

**3    *Any other, If you want to Suggest;***

**4    *What is preferable rate of Carbon Tax for your Industry?***  
a) Not Pay  
b) Lower than 1 US\$ per Mton of CO2 Emissions  
c) 1 to 10 US\$ per Mton of CO2 Emissions  
d) 11 to 20 US\$ per Mton of CO2 Emissions  
e) More than 20 US\$ per Mton of CO2 Emissions  
f) Any other \_\_\_\_\_

**5    *What can be preferred recycled form of revenue?***  
a) revenues raised are not recycled within Pakistan  
b) revenues are used to increase general government expenditure  
c) Reduce income tax.  
d) Any Other \_\_\_\_\_

**6    *How do you evaluate success? In what ways are you determining whether the carbon pricing measures is materially affecting investment decisions and reducing GHG emissions?***

**7    *Do you anticipate that your company will continue to monitor global trends relating to carbon pricing and consider options for internal measures at some point in the future? (Yes/No)***

**8    *Does your company actively engage and seek to inform public debates and regulations relating to carbon pricing policies? (Yes/No)***

**9    *What is your primary reason for not engaging in carbon pricing policy debates?***

**10    *How important are the following policy topics for your company?***

<i>Items</i>	<i>Highly Important</i>	<i>Moderately Important</i>	<i>Not Concerned</i>	<i>Less Important</i>	<i>No Important</i>
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Managing competitiveness and carbon leakage					
Setting stringency/schedule of GHG reductions					
Ensuring flexibility					
Allocating revenues					
Ensuring equity and fairness					
Minimizing market volatility/instability					
Creating links between systems					
Following up-to-date global policy developments					

**SECTION : 6                    BARRIERS AND DRIVERS FOR IMPLEMENTATION OF CARBON TAXATION**

*1. What are two Major Strengths, Weaknesses, Opportunity and Threats of your Industry for Implementation of Carbon Tax?*

<u><b>Strengths</b></u> 1. 2.	<u><b>Opportunity</b></u> 1. 2.
<u><b>Weakness</b></u> 1. 2.	<u><b>Threats</b></u> 1. 2.

*2. Are you availing any tax Exemptions or tax relief policies of Government? (YES/NO)*

*3. If Yes, what kind of exemptions you have provided?*

*4. If you ask to reduce Carbon emissions, what kind of green energy sources will you prefer to adopt?*

a) Wind Energy      b) Solar Energy      c) Electricity      d) Any other \_\_\_\_\_

*5. What is reason behind adoption of particular green energy source?*

*Any Problem on Suggestions:*

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