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Review on Nexus between Economic Growth and Environmental Quality

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Abstract--- *Environmental quality is the most important issue to be discussed now days. The emerging Asian countries are passing through the phase of economic transformation from agriculture to industrialization. Economic development is considered the main cause of increase in pollution so it is assumed that pollution is the bi-product of development. The evolution of Environmental Kuznets curve theory was the debate between the growth and environmental quality. The massive economic growth is the cause of excessive utilization of resources that is the reason of bio diversity loss. The objective of the current study is to check the presence of EKC in emerging Asian countries. The presences of Environmental Kuznets curve will roll out the problem that either increasing rate of growth will affect the environmental quality or not?*

Keywords--- *Environmental Kuznets Curve, Bio Capacity, and Economic Growth.*

I. INTRODUCTION

Economic growth and environmental sustainability are the contemporary issues for both developed and developing countries. Many studies claims that the economic growth is the main cause of environmental degradation (Kasman & Duman, 2015; Uddin, Salahuddin, Alam, & Gow, 2017).

The environmental Kuznets curve postulates a relationship between economic growth and CO2 emission. Basic concept of environmental Kuznets curve define as the economy develop more the environmental will be suffer (Jeffords & Thompson, 2019)

The relationship of economic growth and environmental quality is now turning into complex theoretical model as compare to its initial intuitive concept There are two different responses from the policy makers regarding the relationship of economic growth and environmental quality now concern to sustain the environment for long term (Shafik, 1994)).

Environmental degradation is a major hallmark of industrialization which is the key drivers of economic growth (Loganathan, Shahbaz, & Taha, 2014). As the society develop, there is excessive use of natural resources such as air, water and soil, the destruction of ecosystems and habitat, the disappearance of wildlife and increase in pollution due to deforestation all are the causes of unstable environmental condition (Conservation Energy Future 2016).

Common sense informs us that the increased number of population face the limited resources to survive in this planet. The usage of natural resources is more then the supply. Which will cause of depletion of natural resource, global warming and climatic change. During the past few decades, climate change has becoming the core issue of

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discussion on political and social grounds (Ozturk and Acaravci, 2010; Ahmad et al., 2016). The scientists have a claim that the human activities are largely responsible of Global warming, mainly the deforestation and burning of fossil fuels (IPCC, 2006; NRDC, 2008).

II. RATIONALE ENVIRONMENTAL SUSTAINABILITY

According to the (World Bank, 2007), CO2 emissions increases from the burning of fossil fuels and the manufacture of cement are responsible for almost 60% of GHGs, Moreover it reported that CO2 emissions from burning of fossil fuel and industrial processes contributed about 78% of the increase in total pollution from 1970 to 2010 (IPCC, 2014).

During 1990's, the massive economic growth cause of increased environmental footprint and the environmental degradation (Al-Mulali, Saboori, & Ozturk, 2015). Here the question arise that economic development is the only development related variable that is the cause of environmental degradation; studies regarding the impact of economic and financial development on CO2 emissions have been hypothesized using the Environmental Kuznets Curve (EKC) model.

These studies represent a gap in findings, many studies found that inverted U-shape relationship between economic growth and CO2 emission (Pandelis 2012). Some of them found a monotonic shape (Azomahou, Goedhuys, & van Nguyen, 2009) and others found an N-shape (Carvalho & Almeida, 2010). The current study fills the gap by establishing the relationship between eco growth and CO2 emission, bio capacity and ecological footprints and examined that does the u-shape relationship exists in term of economic growth and bio capacity, ecological foot prints and CO2 emission(Ali, Qureshi, & Mustapha, 2019; Hishan et al., 2018, 2019; Ibrahim, Khan, Ramli, & Qureshi, 2019; Irfan, Rasli, Sulaiman, Sami, & Qureshi, 2019; Latif et al., 2018; Lim et al., 2018; Nor et al., 2018; Qureshi, Elashkar, et al., 2019; Qureshi, Qayyum, et al., 2019; Qureshi, Rasiah, et al., 2019; Qureshi, Yusoff, et al., 2019; Rahim N. S. A., 2019; Rashid M., 2019b, 2019a; Rasli, Qureshi, Isah-Chikaji, Zaman, & Ahmad, 2018; Sami, Jusoh, Md Nor, Irfan, & Qureshi, 2018; T. R. Q. M. I. Shafiq M., 2019; T. R. Q. M. I. T. J. Shafiq M., 2019; Zahid et al., 2019).

III. THEORY IN PERSPECTIVE OF ENVIRONMENTAL QUALITY

There is dire need to understand that as the population increases utilization of resources is also increases. That massively increased number of population faces the limited resources to survive in this planet. To meet the need of finite living resources are used and then regenerated to meet the need of future generation as well. Any forward-looking society will be concerned to discuss the relationship of growth and environmental quality. The discussion between environmental quality and economic development is linked with the debate of modern western civilization when Thomas Malthus (1890) argued the about the poor relief program and call it serious threat to the environment (Raymond 2004).

Malthus mentioned that consumption of resources is grew geometrically which is faster then the growth of resources that are produced arithmetically. The continued pattern of production and utilization of resources revelled the fact that with the passage of time these resources become scarce and the availability of these resources is

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doubtful for future generations. Latter the issue of scare resources turns into the situation of environmental degradation. These aspects are discussed in detail by the help of environmental Kuznets curve theory in the following section.

Environmental Kuznets Theory

There are three major independent studies (Grossman and Krueger 1991; Shafik and Bandyopadhyay, 1992; Panayotou, 1993) that initially examined economic growth and environment relationship and these further give new diminution other academic works in this area.

Grossman and Krueger (1991) discover the point where the pollution emerged and air quality destroyed they said its not only in high income countries but low income countries also victim of environmental degradation. The environment starts improving after the economic growth reach at certain level.

Shafik and Bandyopadhyay (1992) also present the same idea which was issued in the World Bank's 1992 World Development Report. Panayotou (1993) was reported again this published work in the International Labour Organization (ILO) working paper and authenticated the environmental Kuznet curve.

It is argued that low-income country utilized more resources and in this way it faces the situation of resource depletion and its environmental quality also suffered. Shafik and Bandyopadhyay choses the income as a yard sticks to measure the environmental quality. It is stated by Safik (1992) that the under developing countries considered low-income and most environmentally degraded.

The concept of Environmental Kuznets curve defines the relationship between the determinants of environmental degradation and economic growth (Qureshi, 2017 #548). The primary objective of developing countries is economic growth so while passing through the period of transformation, agriculture to industrialization, these countries compromise on environment that will be the reason of increase in dirty industries and excessive use of natural resources.

As the countries economically stable they are more conscious towards environment. At this point the government and concerned authorities make strict policies to take care of the environment as they already achieved the required growth level.

Environmental impacts or per capita emissions are an inverted U-shaped function of per capita. Many studies have assessed inverted u-shape curve that shows initially pollution increases with the increase of economic growth, by the time as economy stable in term of economic growth, environment stats improving.

Following studies estimated inverted U-shaped curve in different counties e.g Canada (Hamit-Haggar, 2012), China (Du et al., 2012), France (Iwata et al., 2010), India (Tiwari et al., 2013), Malaysia (Shahbaz et al., 2013), Russia (Pao and Tsai, 2011), Spain (Esteve and Tamarit, 2012), Turkey (Yavuz, 2014), Thailand (Ratanavaraha and Jomnonkwao, 2015), Pakistan (Ahmed and Long, 2013) and Brazil, China, Egypt, Japan, Mexico, Nigeria, South Korea, and South Africa (Onafowora and Owoye, 2014).

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Table 1: Summary of Studies on Inverted U-shaped Relationship

Authors & Year	Area & Period	Method	Variables	Findings
Kocak and Sarkgunesi (2018)	Turkey 1974-2013	DOLS	CO2 Y, E, FDI	Inverted U-Shaped
Kilic and Balan (2018)	151 nations 1996-2010	POLS	CO2, Y, TR, FD, GOV, PS, E	Inverted U-Shaped
Katircioglu and Celebi (2018)	Turkey 1960-2013	VECM	CO2, Y, E, Debt	Inverted U-Shaped
Churchill et al. (2018)	OECD 1870-2014	MG, PMG, AMG, CEMG	CO2, Y, TR, FD, Popul	Inverted U-Shaped
Alsamara et al. (2018)	GCC 1980-2017	FMOLS, CCE & PMG	CO2, SO2, Y, FD, TR, EC	Inverted U-Shaped
Thao (2018)	51 Countries 2001-2012	Two-way Fixed Effect	CO2, Y, FDI, TR	Inverted U-Shaped
Tjoek and Wu (2018)	10 SE Asian 2003-2013	FE, RE	CO2, SO2, Y, TR,Tech	Inverted U-Shaped
Pata (2018)	Turkey 1974-2014	ARDL	CO2, Y, FD, RE, Urban	Inverted U-Shaped
Wang et al. (2018)	China 2001-2012	FMOLS, DCM	CO2, Y, Reg, Conglomerat	Inverted U-Shaped
Yang et al. (2017)	Russia 1998-2013	-	GHG, Y,	Inverted U-Shaped
Sapkota and Bastola (2017)	14 Latin American 1980-2010	FE, RE	CO2, Y, FDI, CPT, Pop, E, Hcpt, Unemp	Inverted U-Shaped
Taspinar (2016)	Turkey 1974-2010	ARDL, DOLS	CO2, Y, E, FD	Inverted U-Shaped
Al-Mulali et al. (2016)	107 nations 1980-2010	DOLS	CO2, Y	Inverted U-Shaped
Shahbaz et al. (2015)	India 1971-2012	ARDL, LS	CO2, Y, E, TR, FD	Inverted U-Shaped
Jebli et al. (2016)	OECD 1980-2010	FMOLS & DOLS	CO2, Y, M, X,RE,NE,TR	Inverted U-Shaped
Tatulmaz (2015)	Turkey 1968-2007	Johansen Cointegration	CO2, Y, E	Inverted U-Shaped
Kasman and Duman (2015)	EU 1992-2010	Panel Cointegration	CO2, Y, E, TR, FD	Inverted U-Shaped
Omri et al. (2015)	MENA 1990-2011	Panel Cointegration	CO2, Y, E, TR, FD	Inverted U-Shaped
Farhani et al. (2014)	10 MENA 1990-2010	FMOLD, DOLS	CO2, Y, TR, HDI, MAN	Inverted U-Shaped
Onafowora and Owoye (2014)	8 Countries 1970-2010	ARDL, VECM	CO2, Y, E, TR, FD	Inverted U-Shaped
Boutabba 2014	India 1971-2008	ARDL, VECM	CO2, Y, E, TR, FD	Inverted U-Shaped
Farhani and Shahbaz (2014)	Mena 1980-2009	FMOLS, DOL	CO2, Y, RE, NE	Inverted U-Shaped
Yavuz (2014)	Turkey 1960-2007	FMOLS, VECM	CO2, Y, E	Inverted U-Shaped
Al-Mulali et al. (2014)	93 Nations 1980-2008	Panel Cointegration	CO2, Y, E, TR, FD	Inverted U-Shaped
Shahbaz et al. (2014)	UAE 1975-2011	ARDL	CO2, Y, EX, EL	Inverted U-Shaped
Farhani et al. (2014)	Tunisia 1971-2008	ARDL, VECM	CO2, Y, E, TR, FD	Inverted U-Shaped
Danaeifar (2014)	30 Nations 1992-2008	Spatial Panel	CO2, Y	Inverted U-Shaped
Shahbaz et al. (2014)	Tunisia 1971-2010	ARDL, VECM	CO2, Y, E, TR, FD	Inverted U-Shaped
Shahbaz et al. (2013)	Turkey 1970-2010	VECM Causality	CO2, Y	Inverted U-Shaped
Wang (2013)	19 Nations 1870-2001	Fixed and Random Effect	CO2, SO2, Y	Inverted U-Shaped
Sephton and Mann (2013)	Spain 1857-2007	Threshold Cointegration	CO2, Y	Inverted U-Shaped
Fosten et al. (2012)	UK 1830-2003	Threshold Cointegration	CO2, SO2, Y	Inverted U-Shaped
Arouri et al (2012)	MENA 1981-2005	CCE	CO2, Y, E	Inverted U-Shaped
Grossman and Krueger (1991)			SO2, BOD, Y, SPM,	Inverted U-Shaped

IV. EMPIRICAL EVIDENCE FROM CROSS-COUNTRIES

The 20th century was characterized by rapid growth in human societies, and over the last century, world population multiplied, and current energy consumption increases more than ten times as it was used previously. Our

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planet has limited resources and the problem is that the ratio and pace of regeneration is very slow. Development of economy increases the pace of globalization and urbanization, that's why there is massive use of resources; more and more human demand for resources is beyond that what planet Earth can supply.

Humanity is now using at least 25 percent more than the earth's capacity. This global overshoot indicates that we are reducing and degrading the biological capital on which the human economy depends, while letting the waste accumulating around us. The above debates focus on the dynamic association based on the four reliable hypotheses, which are growth, conservation, feedback, and neutrality hypotheses.

Mentioning to each of this hypothesis, the current literature shows that most of the studies of the environmental quality-growth nexus have been extensively examined in the literature (Liu et al., 2018; Amri, 2017; Rafindadi & Ozturk, 2016; Karanfil & Li, 2015; Khatun & Ahmad, 2015; Wolde-Rufael, 2014; Hamdi et al., 2014; Bekhet & Othman, 2014; Tang & Tan, 2013; Chandran et al., 2010; Lean & Smyth, 2010; Lorde et al., 2010; Jamil & Ahmad, 2010; Narayan et al., 2009) and the results are contradictory.

The world-average ecological footprint in 2012 was 2.84 global hectares per person (22.1 billion in total) with a world-average bio capacity of 1.73 global hectares (gha) per person (9.2 billion in total), this leads to a global ecological deficit of 1.1 global hectares per person (7.8 billion in total). From 1961 to 2010, Ecological Footprint accounts indicate that human demand for renewable resources and ecological services increased by nearly 40% (from 7.6 to 18.1 billion global hectares2), and it refers to unstable environment conditions, unstable environmental condition arise when bio capacity (i.e. supply of nature) is less than the ecological footprints (i.e demand from nature), reaching a point where the planet's bio productive area (increased from 9.9 to 12 billion global hectares) is no longer sufficient to support the competing demands.

In 2010, humanity demanded the equivalent of approximately 1.54 Earths worth of provisioning and regulatory services. Significant bio capacity deficits exist in many countries and a difference can be made between countries that are driving global shift of anthropological encouraged pressure and countries where such pressure shift is taking place (Galli, Wackernagel, Iha, & Lazarus, 2014).

V. CONCLUSION

The above debates focus on the dynamic association based on the reliable current literature shows that most of the studies of the environmental quality-growth nexus have been extensively examined in the literature and the results are contradictory (Liu & Kim, 2018). Therefore, this study found that there are four main research gaps to fill in this study.

The validity EKC hypothesis is challenged on many grounds, previously the EKC measure the quality of environment in term of growth and co2 relationship. The motivation of the thesis is a on one major point identified by very few researchers that measurement of EKC by only one proxy that is CO2 emission is not giving us the clear picture of the environmental situation. Here the gape of the study is to check the EKC with Bio-capacity and Ecological footprints along with CO2 emission. The present study uses these three proxies to measure the environmental quality.

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The proxies of the environmental quality help to find the gap of resources available and utilized. Hence the gape between the resources utilized and produced is the biggest hurdle in the way of maintaining the environmental quality. As more and more resources uses by the developing countries and more and more waste is also produced so to regenerate and to absorb this waste capacity of the land is not measured previously, the present study help policy maker to figure out the current situation of biological resources available to the mentioned countries and the rate of utilization of these resources as well. So the gape created due to economic growth is well defined by the current study. This situation will be better define the situation of the economy in a way that if the utilization of resources in term of economic growth is more then the gap is the rate of regenerate them this situation will be refer to the condition of environmental degradation.

The various important explanatory variables other then economic growth incorporated to take the better picture of the environmental quality, e.g. financial development, energy consumption, urbanization, economic activities. Previously these expletory variables tested with the CO2 emission only, but the current study will fill the gap by testing all these expletory variables with the bio capacity and ecological footprint, that are the important proxies to measure the environmental quality. The present study conducted in the most important region that are highly sensitive in term of environment, the major cities of India and Pakistan are the top listed cities in environmental quality index. These most overpopulated cited of India and Pakistan is cross the danger level that is fixed to take breath. The air quality index issue the report during last year show the serous situation of the cities belongs to India Pakistan. On the other hand Malaysia and Thailand is also most polluted cities of the region as the development takes place in both region rapidly and Malaysia soon declared as developed economy. These rapid developments bring about the massive changes in the environment. To look closely the environment these three proxies of environment will help the policymakers to form such polices that will help environment to sustain.

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